



U.S. Fish & Wildlife Service

Rhode Island National Wildlife Refuge Complex

*Draft Comprehensive Conservation
Plan and Environmental Assessment*

Vision Statement

“The Rhode Island National Wildlife Refuge Complex protects a unique collection of thriving coastal sandplain and beach strand communities, which represents some of the last undeveloped seacoast in southern New England. Leading the way in the protection and restoration of wetlands and early successional coastal habitats, the Refuge Complex insures long-term sustainability of migratory and resident native populations, and contributes to the recovery of threatened and endangered species. These refuges offer research opportunities and provide a showcase of habitat management for other landowners.”

“The Refuge Complex is the premiere destination for visitors to coastal Rhode Island to engage in high quality, wildlife-dependent recreation. Hundreds of thousands of visitors are rewarded each year with inspiring vistas and exceptional, barrier-free opportunities to view wildlife in native habitats. Innovative environmental educational and interpretive programs effectively promote better stewardship of coastal resources.”

“Through partnerships and extensive outreach efforts, Refuge staff are committed to accomplishing Refuge goals and significantly contributing to the Mission of the National Wildlife Refuge System. This commitment will strengthen with the future, revitalizing the southern New England ecosystem for generations to come.”

U.S. Fish and Wildlife Service
Division of Planning
Northeast Regional Office
300 Westgate Center Drive
Hadley, MA 01035

December 2000



White water lily
USFWS photo

Purpose of and Need for Action

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Introduction and Background

This draft Comprehensive Conservation Plan and Environmental Assessment (draft CCP/EA) for the Rhode Island National Wildlife Refuge Complex (Refuge Complex) combines two documents required by federal law: a Comprehensive Conservation Plan (CCP), required by the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act; Public Law 105-57); and an Environmental Assessment (EA), required by the National Environmental Policy Act of 1969 (NEPA; Public Law 91-190).

Chapter 1, Purpose of and Need for Action, sets the stage for Chapters 2 through 4. It...

- Describes the purpose and need of a CCP/EA for the Refuge Complex
- Identifies national, regional, and state plans that influenced this draft
- Highlights the purpose for which each of the five refuges in the Refuge Complex was established and its land acquisition history
- Presents the vision and goals for the Refuge Complex
- Explains the planning process for developing this draft CCP/EA, and
- Describes its key issues, concerns, and opportunities

Chapter 2, Description of the Affected Environment, describes the existing physical, biological, and human environment.

Chapter 3, Alternatives, describes alternative management strategies for meeting goals and responding to key issues and compares them to current management.

Chapter 4, Environmental Consequences, evaluates the environmental consequences of implementing each of the proposed management alternatives.

Chapter 5, List of Preparers, credits Service and non-Service contributors.

Chapter 6, Consultation and Coordination with Others, summarizes each public involvement activity.

Eleven appendices provide additional references and information used in compiling this draft CCP/EA.

The Purpose of and Need for a CCP

Our goal is a CCP for each refuge in the Refuge Complex that attains its vision and goals; best achieves each refuge's purpose; contributes to the mission of the National Wildlife Refuge System (Refuge System); addresses key issues and relevant mandates; and uses sound principles of fish and wildlife science.

As NEPA requires, this draft CCP/EA evaluates a reasonable range of alternatives and the predictable socio-economic, physical, and biological impacts of implementing each alternative. We designed each alternative with the potential to develop into a CCP for each of the five refuges (see *Analysis Area*). Those plans will guide our management decisions and actions over the next 15 years, and help the public and our partners understand and support them.

Developing a CCP is vital to the management of each refuge. The final CCPs will provide strategic management direction over the next 15 years, by...

- Providing a clear statement of desired future conditions for habitat, wildlife, visitor services, and facilities;
- Providing refuge neighbors, visitors, and partners with a clear understanding of the reasons for management actions;
- Ensuring refuge management reflects the policies and goals of the Refuge System and legal mandates;
- Ensuring the compatibility of current and future public use;
- Providing long-term continuity and direction for refuge management; and
- Providing direction for staffing, operations, maintenance, and developing budget requests.

The need to develop CCPs for the Refuge Complex is two-fold. First, the Refuge Improvement Act requires that all national wildlife refuges have a CCP in place by 2012 to help fulfill the mission of the Refuge System. Second, the Refuge Complex lacks a master plan that establishes priorities and ensures consistent, integrated management among its five refuges.

Our vision statement and Refuge Complex-wide goals, management strategies, and actions will help us effectively manage natural resources and priority, wildlife-dependent recreational uses. By involving the public and conservation partners, it will help us resolve persistent issues of non-wildlife-dependent public use, beach access, and management for threatened and endangered species. It will help us develop criteria for evaluating available sites for a new Refuge Complex headquarters and visitor center. Finally, it will help us consider expanding each of the five refuges to ensure their sustained biological integrity. All of these reasons clearly underscore the need for the type of strategic direction a CCP provides.

Analysis Area

The Refuge Complex comprises five national wildlife refuges.

Map 1-1 shows their locations.

- Block Island National Wildlife Refuge (Block Island Refuge) on Block Island, Town of New Shoreham;
- Ninigret National Wildlife Refuge (Ninigret Refuge), in the Town of Charlestown;
- John H. Chafee National Wildlife Refuge (Chafee Refuge), in the Towns of South Kingstown and Narragansett;
- Sachuest Point National Wildlife Refuge (Sachuest Point Refuge), in the Town of Middletown; and
- Trustom Pond National Wildlife Refuge (Trustom Pond Refuge), in the Town of South Kingstown.



Freshwater wetland.

USFWS photo

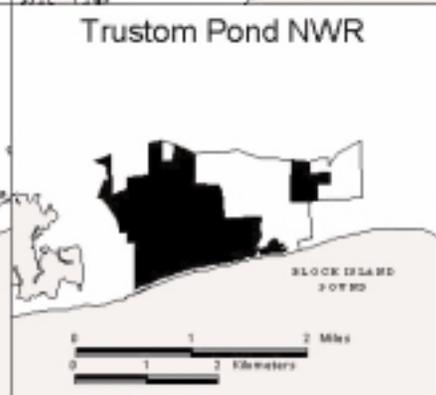
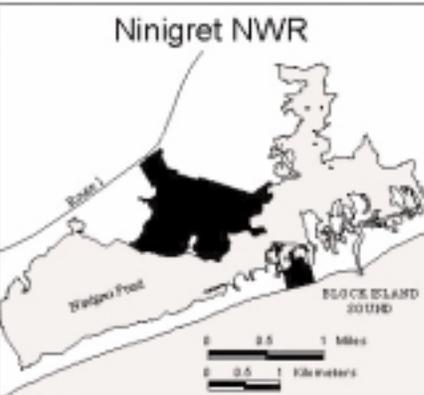
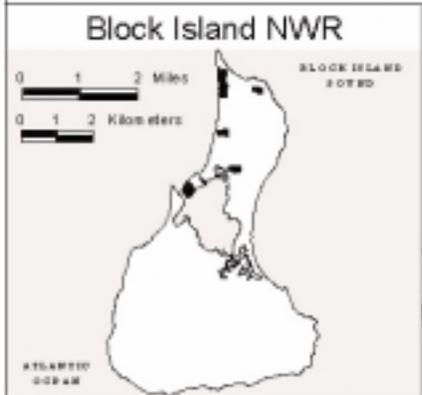
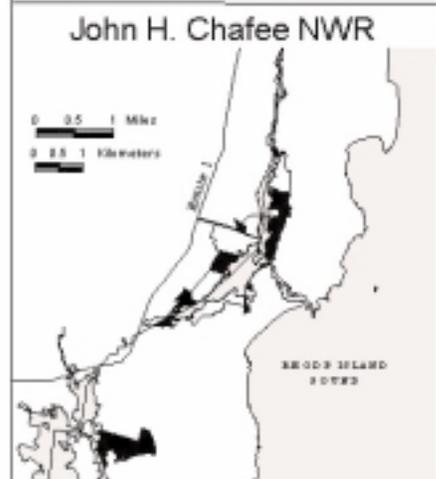
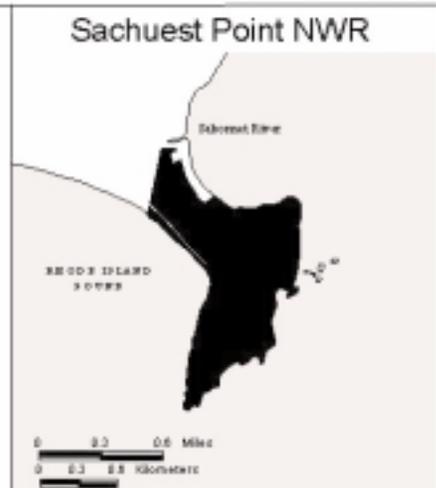
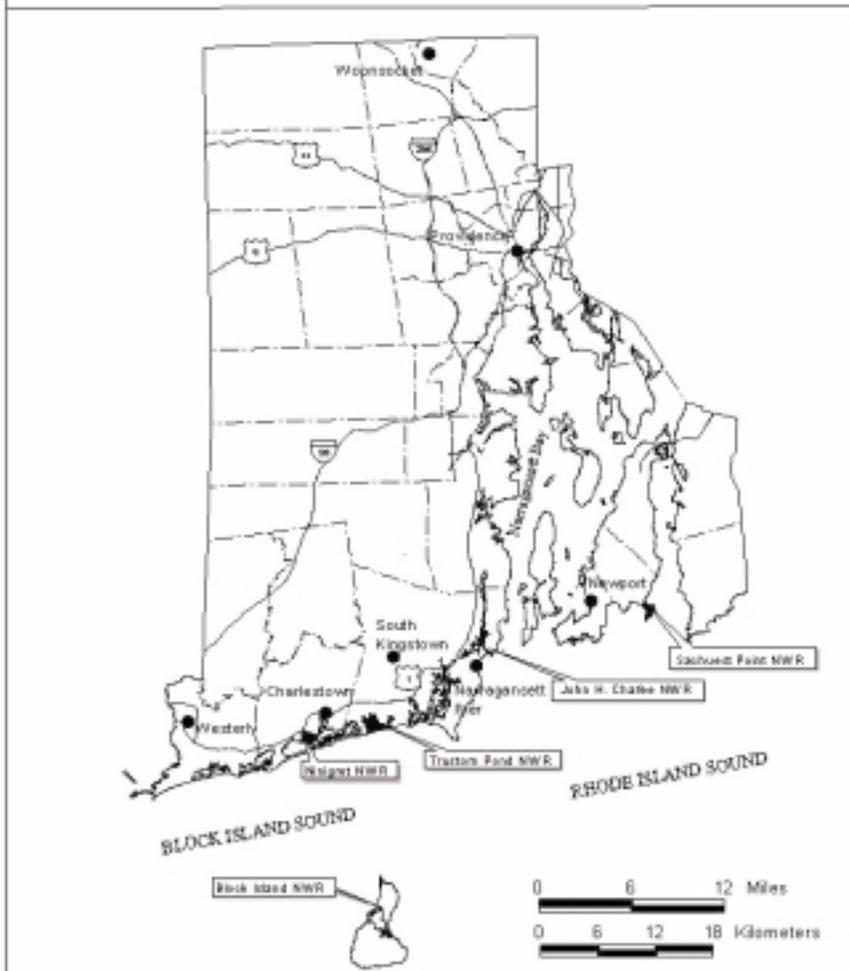
Our planning team not only evaluated current refuge lands, but also evaluated significant habitats within five Areas of Biological Significance (ABS) in southern Rhode Island, southeastern Connecticut, and southwestern Massachusetts. Those ABS represent contiguous coastal landscapes, typically defined by watersheds or other landscape-level, geomorphologic features, where trust species and other species and habitats of special management concern occur. They also represent the ecosystems in which those resources primarily flow, move, or are transported. Appendix A lists the species and habitats of management concern used in defining the ABS. **Map 1-2** depicts their boundaries, drawn to link existing protected lands.

Decision to Be Made

Based on the Service mission, the Refuge System mission, the purposes for which each of the refuges was established, other legal mandates, public and partner responses to this draft CCP/EA, and completion of a final CCP/EA, the Regional Director will select a preferred alternative and issue a Finding of No Significant Impact (FONSI). The Regional Director's selected alternative could be the proposed action in the draft CCP/EA, the no action alternative, or a combination of actions or alternatives presented. The final decision will identify the desired combination of species protection, habitat management, public use and access, administration, and new land acquisition for the Refuge Complex. A FONSI certifies that we have met agency compliance requirements and that the CCPs, when implemented, will achieve the purposes of the refuge and help fulfill the Refuge System mission. Once the Regional Director has signed the FONSI and we have completed stand-alone CCPs for each refuge, we will notify the public in the *Federal Register*, and implementation can begin.

Rhode Island National Wildlife Refuge Complex

U.S. Fish & Wildlife Service Current Ownership



Data Sources:

Rhode Island State and Town Boundaries from MassGIS
 USFWS Refuge Boundaries
 USGS 1:100,000 Roads

Map prepared for RI Complex Comprehensive Conservation Plan, November 2000.

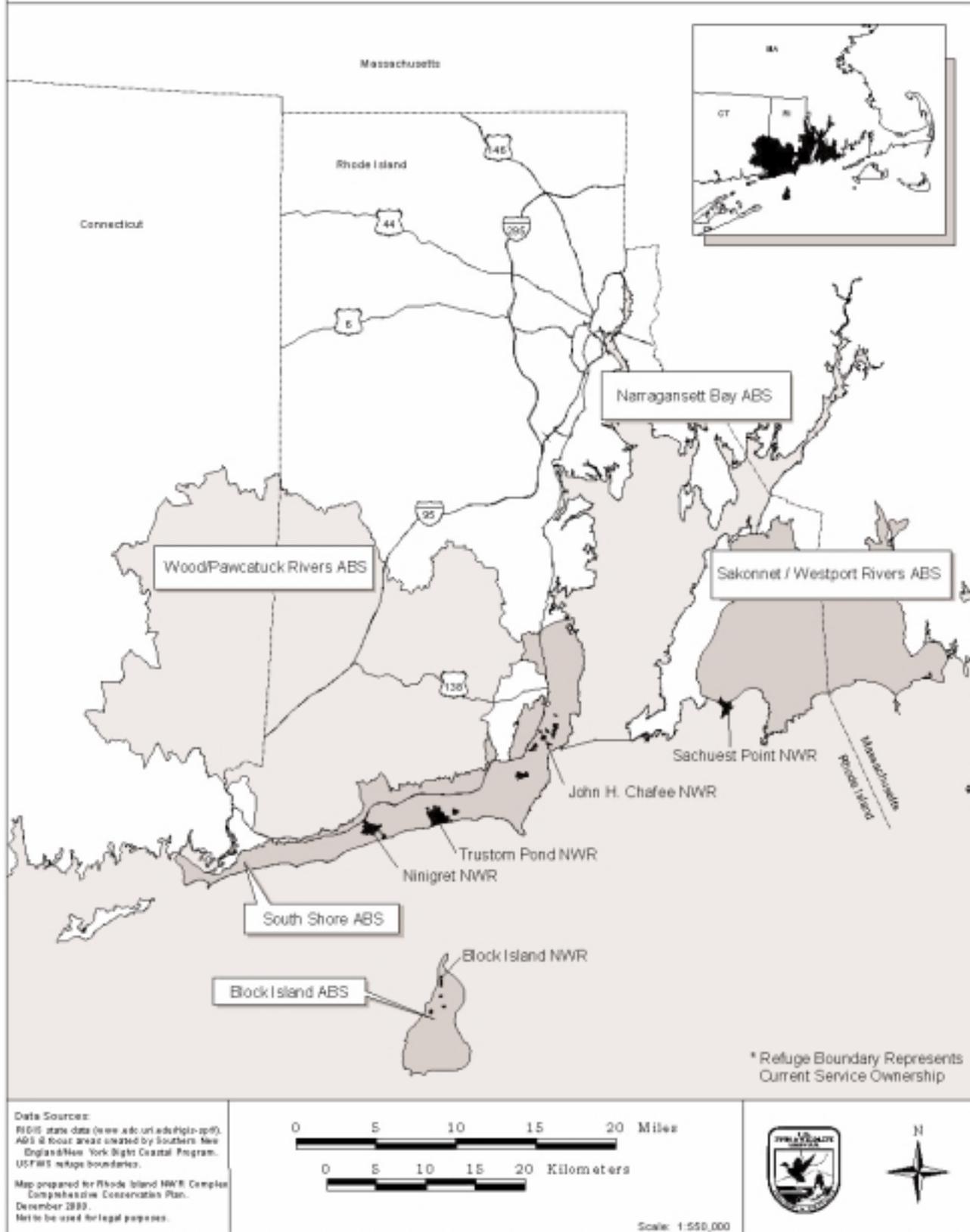
Block Island: Established in 1973; currently 102 acres
 John H. Chafee: Established in 1988; currently 322 acres
 Ninigret: Established in 1970; currently 409 acres
 Sachuest Point: Established in 1973; currently 242 acres
 Trustum Pond: Established in 1973; currently 642 acres

*Acreage figures are approximate.



Areas of Biological Significance (ABS) in southern Rhode Island

Rhode Island NWR Complex Comprehensive Conservation Plan



National and Regional Mandates Guiding this Project

This section highlights Service policy, legal mandates, and existing resource plans, arranged from the national to the local level, that directly influenced development of this draft CCP/EA.

The U.S. Fish and Wildlife Service and its Mission

"...working with others, to conserve, protect and enhance fish wildlife, and plants and their habitats for the continuing benefit of the American people."

– Mission, U.S. Fish & Wildlife Service

The Service, part of the Department of the Interior, manages national wildlife refuges and national fish hatcheries. By law, Congress entrusts national resources to the Service for conservation and protection: migratory birds and fish, endangered species, inter-jurisdictional fish, wetlands, and certain marine mammals. The Service also enforces federal wildlife laws and international treaties on importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

The National Wildlife Refuge System and its Mission

The Refuge System is the world's largest collection of lands and waters set aside specifically for conserving wildlife and protecting ecosystems. More than 525 national wildlife refuges, in every state and a number of U.S. Territories, protect more than 93 million acres. More than 34 million visitors annually hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretive activities on refuges.

"...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

– Refuge System Mission, Refuge Improvement Act; Public Law 105-57

In 1997, Congress passed the National Wildlife Refuge System Improvement Act, establishing a unifying mission for the Refuge System, and a new process for determining compatible public use activities on refuges. It also requires that we prepare a CCP for each refuge. The act states that, first and foremost, the Refuge System must focus on wildlife conservation. It further states that the mission of the Refuge System, coupled with the purpose(s) for which each refuge was established, will provide the foundation for management direction for each refuge.

On public use, the act declares that all existing or proposed public uses must be compatible with each refuge's purpose. It highlights six wildlife-dependent public uses as priorities that all CCPs must evaluate: environmental education and interpretation, fishing, hunting, and wildlife observation and photography. Each refuge manager determines the compatibility of an activity by evaluating its potential impact on refuge resources, insuring that the activity supports the Refuge System mission, and ensuring that the activity does not materially detract from or interfere with the refuge purpose.

Fulfilling the Promise

“This report on the National Wildlife Refuge System is the culmination of a year-long process involving teams of Service employees who examined the Refuge System within the framework of Wildlife and Habitat, People, and Leadership. The report was the focus of the first-ever System Conference held in Keystone, Colorado in October 1998, attended by every refuge manager in the country, other Service employees, and scores of conservation organizations.... The heart of the report is the collection of vision statements and 42 recommendations....” Those recommendations helped guide the development of goals, strategies and actions in this draft CCP/EA.

Other Legal and National Policy Mandates

While the purpose for their establishment provides the foundation for managing refuges, they must also comply with a variety of other federal laws, Executive Orders, treaties, interstate compacts, and regulations on conserving and protecting natural and cultural resources. Appendix B summarizes some important federal laws governing refuge management. Chapter 4, Environmental Consequences, specifically evaluates each alternative’s compliance with the Clean Water Act, Clean Air Act, the National Historic Preservation Act, the Archaeological Resources Protection Act, and the Endangered Species Act. This draft CCP/EA is written to fulfill compliance with NEPA. The Service Manual and Refuge Manual contain Service policies and guidance on planning and day-to-day refuge management.

North American Waterfowl Management Plan

“Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area.”

– Goal, Atlantic Coast
Joint Venture

NAWMP outlines the strategy among the United States, Canada, and Mexico to restore waterfowl populations by protecting, restoring, and enhancing habitat within 11 U.S. Joint Venture Areas and three species Joint Ventures: Arctic Goose, Black Duck, and Sea Duck. Partnerships among federal, state and provincial governments, tribal nations, local businesses, conservation organizations, and individual citizens protect that habitat. The Refuge Complex lies within the Atlantic Coast Joint Venture (U.S. regional), which has identified 13 priority focus areas totaling 3,226 acres of both wetlands and adjacent uplands for protection in Rhode Island (Atlantic Coast Joint Venture 1988). Three priority focus areas in the Refuge Complex are Trustom Pond, Ninigret Pond, and the Pettaquamscutt (Narrow) River.

Since black ducks winter in Rhode Island, the goals and objectives of the Black Duck Joint Venture (species) apply to managing the Refuge Complex. The Black Duck Joint Venture has identified the coastal salt marsh habitats along the mid-upper Atlantic coast as most important wintering habitat. One priority focus area in that Joint Venture includes Chafee Refuge.

Goals and objectives of the Sea Duck Joint Venture are also relevant to this plan. Many sea duck species winter in Rhode Island coastal waters, including a population of harlequin ducks off of Sachuest Point Refuge.

Partners In Flight Landbird Conservation Plan: Physiographic Area 9, Southern New England (unfinished draft, October 20, 1998)

In 1990, Partners in Flight (PIF) was conceived as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industry, and other citizens dedicated to reversing the downward trends of declining species and “keeping common birds common.” The foundation of PIF’s long-term strategy for bird conservation is a series of scientifically based Landbird Conservation Plans. The goal of each PIF Landbird Conservation Plan is to ensure long term maintenance of healthy populations of native landbirds.

The Partners in Flight Program is developing a plan for the Southern New England Physiographic Area, using existing data on habitat loss, landbird population trends, and the vulnerability of species and habitats to threats, to rank the conservation priority of landbird species. The plan will identify focal species for each habitat type from which population and habitat objectives and conservation actions will be determined. We utilized this draft document for the list of priority species to consider in management. A final plan, which will include management recommendations, will help direct future landbird management on the Refuge Complex.

Northeast Areas Study: Significant Coastal Habitats of Southern New England And Portions of Long Island, New York (USFWS 1991)

Recognizing the biological and economic importance of the coast’s living resources and natural values to the region and the Nation, in 1990 Congress funded a study to identify coastal areas in southern New England and Long Island whose fish and wildlife habitat need protection and whose natural diversity needs preservation. The Northeast Coastal Study identifies species of regional importance, and describes regionally significant habitat complexes. It specifically describes significant or unique habitat, threats to sustaining the habitat complex, and considerations for conserving and protecting it. We utilized this study in the development of our land protection strategies. The study identifies these habitat complexes in Rhode Island:

1. Fishers Island Sound (located in Suffolk and New London Counties, CT, and Washington County, RI)
2. Block Island (Washington County, RI)
3. Chapman Swamp/Pawcatuck River (Washington County, RI)
4. Maschaug Pond and Beach (Washington County, RI)
5. Areas North and East of Trustom Pond and Green Hill Swamp (Washington County, RI)
6. Hundred Acre Cove/Palmer River (Bristol and Providence Counties, RI)
7. Rhode Island Sound/Buzzards Bay Beach (Newport and Bristol Counties, RI)

Connecticut River/Long Island Sound Ecosystem Priorities, 1997

During the last decade, we have emphasized ecosystem conservation, particularly the role of refuges within ecosystems, and their ability to affect the long-term conservation of natural resources. Implementing an ecosystem approach to resource management is one of our top national priorities. We have initiated new partnerships with private landowners, state and federal agencies, corporations, conservation groups, and volunteers, to form 52 ecosystem teams across the country, typically using large river watersheds to define ecosystems. Those teams work on developing goals and priorities for research and management within each ecosystem.

The Refuge Complex lies within our Connecticut River/Long Island Sound Ecosystem (**Map 1-3**). A team composed of Fish and Wildlife Service personnel and representatives from six State Fish and Wildlife Departments developed a Priority Resources Plan (July 1996) that identifies seven priorities, each involving numerous action strategies.

1. Protect, restore, and enhance listed and candidate populations...with special emphasis on beach strand species, coastal sandplain habitat, and Connecticut River species.
2. Protect, restore, and enhance anadromous and interjurisdictional migratory fish populations...with special emphasis on Atlantic salmon, American shad, shortnose sturgeon, and river herring.
3. Reverse the decline of migrant landbirds...with special emphasis on grassland and forest interior species.
4. Protect, restore, and enhance populations of colonial nesting waterbirds, shorebirds, and waterfowl...with special emphasis on coastal areas and major rivers.
5. Protect, restore, and enhance wetland habitats.
6. Manage refuge lands to protect, restore, and enhance native communities and trust resources.
7. Develop a public that values the fish and wildlife resources...understands events and issues related to these resources, and acts to promote fish and wildlife conservation.

Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan, 1996



Piping plover chick. USFWS photo

The piping plover is the only federally-listed endangered or threatened species that currently breeds on Refuge lands within the Rhode Island Refuge Complex. The primary objective of the revised recovery program is to remove the Atlantic coast piping plover population from the List of Endangered and Threatened Wildlife and Plants by:

- Achieving well-distributed increases in numbers and productivity of breeding pairs; and
- Providing for long-term protection of breeding and wintering plovers and their habitats.

The Revised Recovery Plan describes detailed “Recovery Tasks” needed to meet the recovery objective. The Rhode Island Refuge Complex is specifically mentioned in the following tasks:

- Draw down or create coastal ponds where feasible to make more feeding habitat available.
- Reduce disturbance of breeding plovers from humans and pets.
- Develop mechanisms to provide long-term protection of plovers and their habitat.

The Recovery Plan incorporates guidelines developed in 1994 by our Ecological Services Division, which include guidelines for managing recreational activities in piping plover breeding habitat. While not regulatory, these recommendations continue to serve as our best professional advice for complying with the Endangered Species Act. We utilized these same guidelines in developing management actions.

American Burying Beetle (*Nicrophorus americanus*) Recovery Plan, 1991

“Reduce the immediacy of the threat of extinction to the American burying beetle, and the longer range objective is to improve its status so that it can be reclassified from endangered to threatened.”

– American Burying Beetle Recovery Plan objective

The American burying beetle is a federally listed species (endangered) that is known to breed on southern Block Island, but no breeding behavior has yet been observed on Block Island Refuge. One female was recorded on the Beane tract, but was not seen on subsequent visits. No extensive surveys have been conducted on the Refuge; interest has focused on southern Block Island, where the core population is assumed to breed. Since the island supports the only known occurrence east of the Mississippi River, any opportunity to protect or enhance habitat for this species is a priority.

The Recovery Plan objective is “...[to] reduce the immediacy of the threat of extinction to the American burying beetle, and the longer range objective is to improve its status so that it can be reclassified from endangered to threatened.” It outlines nine specific Recovery Tasks for protecting and managing the existing populations, searching for new populations, re-introducing populations, conducting natural history studies, and starting an environmental education program.

Regional Wetlands Concept Plan – Emergency Wetlands Resources Act 9 (USFWS 1990)

In 1986, Congress enacted the Emergency Wetlands Resources Act to promote the conservation of our nation's wetlands. The Act directed the Department of Interior to develop a National Wetlands Priority Conservation Plan identifying the location and types of wetlands that should receive priority for acquisition by federal and state agencies using Land and Water Conservation Fund appropriations. In 1990, the Service's Northeast Region completed a Regional Wetlands Concept Plan identifying a total of 850 wetland sites in the Region warranting consideration for acquisition due to wetland values. Wetland values, functions, and potential threats for each site were cited; 24 sites within the State of Rhode Island were listed.

Protecting Our Land Resources: A Land Acquisition and Protection Plan, Rhode Island Department of Environmental Management, May 1996

The purpose of this State plan is to assist agencies within the Rhode Island Department of Environmental Management (RI DEM) in protecting land to support their primary mission, "...protection of the integrity of natural resources essential to the environmental, economic and social welfare of the citizens of Rhode Island." Its framework provides strategies to permanently protect five critical State resources: agriculture, forestry, drinking water, recreation, and natural heritage and biodiversity. It includes evaluation criteria for selecting and prioritizing lands.

Special Area Management Plans – Salt Pond Region and Narrow River, November 1998

These plans detail management strategies for implementing the program standards of the State of Rhode Island Coastal Resources Management Council (CRMC) in the Salt Pond Region and Narrow River Watershed. The Salt Pond Region SAMP includes eight objectives. Six relate to our CCP:

1. To maintain the exceptional scenic qualities of the Salt Pond Region, and a diversity in the mix and intensity of the activities they support.
2. To prevent expansion near areas of the salt ponds that are contaminated by potentially harmful bacteria or eutrophic conditions.
3. To ensure the groundwater will be unpolluted.
4. To preserve and enhance the diversity and abundance of fish and shellfish.
5. To restore the barrier beaches, salt marshes, and fish and wildlife habitats damaged by past construction or present use.
6. To create a decision-making process appropriate to the management of the region as an ecosystem.

The Narrow River SAMP defines these objectives relevant to our CCP:

1. Provide for a balance of compatible uses, consistent with the CRMC responsibility for preserving, protecting, and restoring coastal resources.
2. Provide a regional plan for the Narrow River that recognizes that the watershed functions as an ecosystem.
3. Identify ways nitrogen can be reduced in the watershed through new technologies.
4. Revise and update existing policies and standards as well as recommendations to municipalities and federal and state agencies.
5. Update all maps using the Rhode Island Geographic Information System, and modify SAMP boundaries as needed to manage for erosion and water quality pollution.
6. Identify and prioritize future research agendas for the region.

Establishing Legislation

Refuges can be established under a variety of legislative and administrative authorities: by Congress through special legislation; by the President through Executive Order; or administratively by the Secretary of Interior (delegated to the Director of the Service), who is authorized by Congress through the following legislation:

Migratory Bird Conservation Act of 1929, as amended, established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds.

Fish and Wildlife Coordination Act of 1934, as amended, authorizes the acceptance by the Service of funds or lands for wildlife purposes provided that land donations received the consent of the State in which they are located.

Fish and Wildlife Act of 1956, as amended, authorizes the Secretary to acquire lands and waters or interests therein for the development, management, advancement, conservation, and protection of fish and wildlife resources, using Land and Water Conservation Fund monies.

Refuge Recreation Act of 1962, as amended, authorizes acquisition of land for (1) incidental fish and wildlife-oriented recreational development; (2) protection of natural resources; and (3) conservation of endangered or threatened species. It further authorizes the Secretary to accept and use donations of funds and real or personal property to assist in carrying out its purposes.

In the latter situation, we use the NEPA process to notify and consult with the public. Every new national wildlife refuge is established with a stated purpose and an acquisition boundary. We are authorized to purchase land within the acquisition boundary without further NEPA documentation. The purpose for which a refuge was established provides the foundation for making management decisions. All activities must be compatible with its purpose.

National Wildlife Refuge System Administration Act of 1966, as amended, authorizes the Secretary to acquire and manage land using donated funds or by exchange of land.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1972, as amended, authorizes the transfer of real property no longer needed by a Federal agency to the Secretary of the Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Endangered Species Act of 1973, as amended, authorizes acquisition of land for the conservation of listed species using Land and Water Conservation Funds.

Emergency Wetland Resources Act of 1986, authorizes the purchase of wetlands which are not covered under the authority of the Migratory Bird Conservation Act, using Land and Water Conservation Funds.

North American Wetlands Conservation Act of 1989, created the North American Wetlands Conservation Council to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission.

Refuge Land Acquisition Histories

Chafee Refuge was established through legislation in 1988. The other four refuges were established administratively. Their purpose(s) and land acquisition histories follow.

Block Island Refuge

The establishment purpose for Block Island Refuge is:

"...particular value in carrying out the national migratory bird management program."

- Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1972, as amended

Established in 1973, Block Island Refuge is located approximately 12 miles off the mainland on Block Island, Town of New Shoreham (see **Map 1-1**). The transfer of 28.7 acres from the U.S. Coast Guard created the Refuge. Subsequently, we have acquired other lands under the authority of the Fish and Wildlife Act of 1956 (see **Map 1-4**). The Refuge now owns all the land within its current, approved acquisition boundary (102 acres).

Thirty percent of Block Island is currently in conservation status, including lands owned or administered by the Service, The Nature Conservancy, Block Island Land Trust, Block Island Conservancy, Town of New Shoreham, Audubon Society of Rhode Island, and individual private land owners. In 1989, New Shoreham passed a referendum that transfers 3 percent of property taxes into a land acquisition fund administered by the Block Island Land Trust.

Table 1-1. Summary of land acquisition for Block Island Refuge.

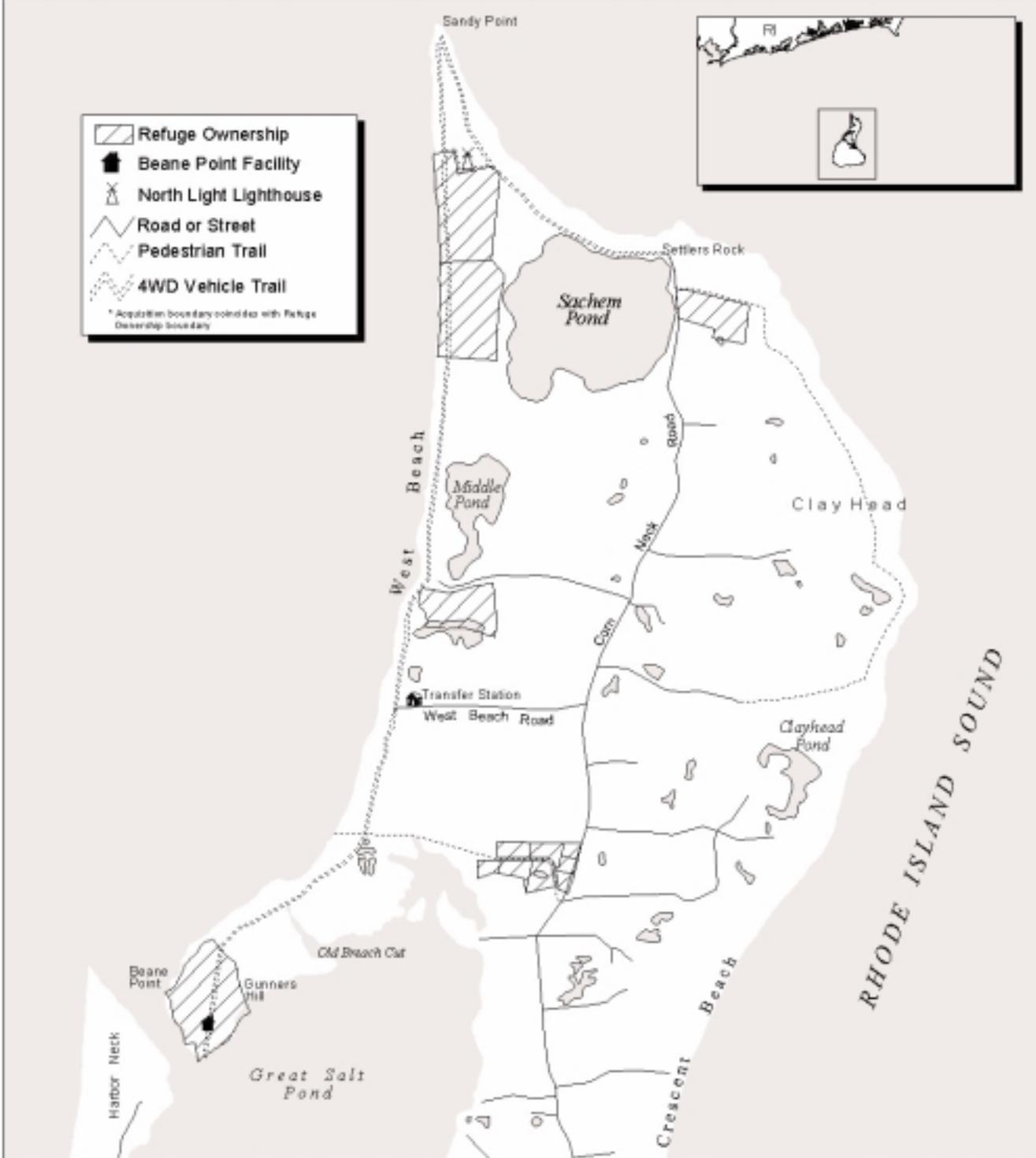
<i>Date</i>	<i>Acres Transferred</i>	<i>Acres Purchased</i>	<i>Comments</i>
1973	28.7		from USCG
1984	-	20 (easement, minus 2.4 acres traded fee title)	adjacent to North Light
1994	-	21.8	Beane Point
1998	-	24.4	O'Toole, Nevus-Greenburg
1999	-	9.7	Kurz

Total acreage = 102

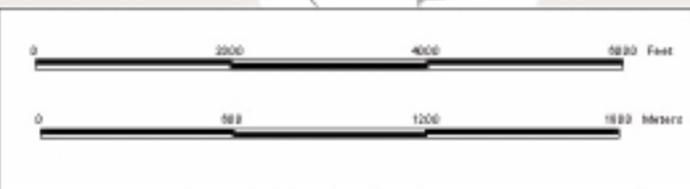
Block Island National Wildlife Refuge

Current Service Ownership

Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 Roads & Hydrography
 All other data provided by USFWS, RIGIS & So. New England/NY Right Coastal Program.
 Map prepared for Rhode Island NWR Complex Comprehensive Conservation Plan, December 2000.
 Not to be used for legal purposes.



Ninigret Refuge

Ninigret Refuge is located in Charlestown, Rhode Island, 30 miles south of Providence (see **Map 1-1**). Transfers of land from the U.S. Navy to the Service primarily established and expanded the Refuge: In 1970, 27.5 acres of the Ninigret Pond barrier beach; in 1979, 316.4 acres of the Naval Landing Field; and in 1982, an additional 60 acres. The Refuge now owns all the land within its current, approved acquisition boundary (see **Map 1-5**). **Table 1-2** summarizes its land acquisition history.

The establishment purposes for Ninigret Refuge are:

"[of] use as an inviolate sanctuary, or for any other management purpose, for migratory birds"

– Migratory Bird Conservation Act of 1929 and Public Law 80-537

"...particular value in carrying out the national migratory bird management program"

– Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1972, as amended

Two different parcels compose Ninigret Refuge. Its mainland parcel, bordered on the west by Foster's Cove, on the south by Ninigret Pond, on the east by Ninigret Park (Town of Charlestown), and on the north by U.S. Route 1, contains 382 acres with 3 miles of shoreline on Ninigret Pond. The mainland parcel is the largest piece of open space around Ninigret Pond, and soon may be an island of protected natural habitat surrounded by development. The barrier beach parcel contains 27.5 acres between Ninigret Pond and Block Island Sound.

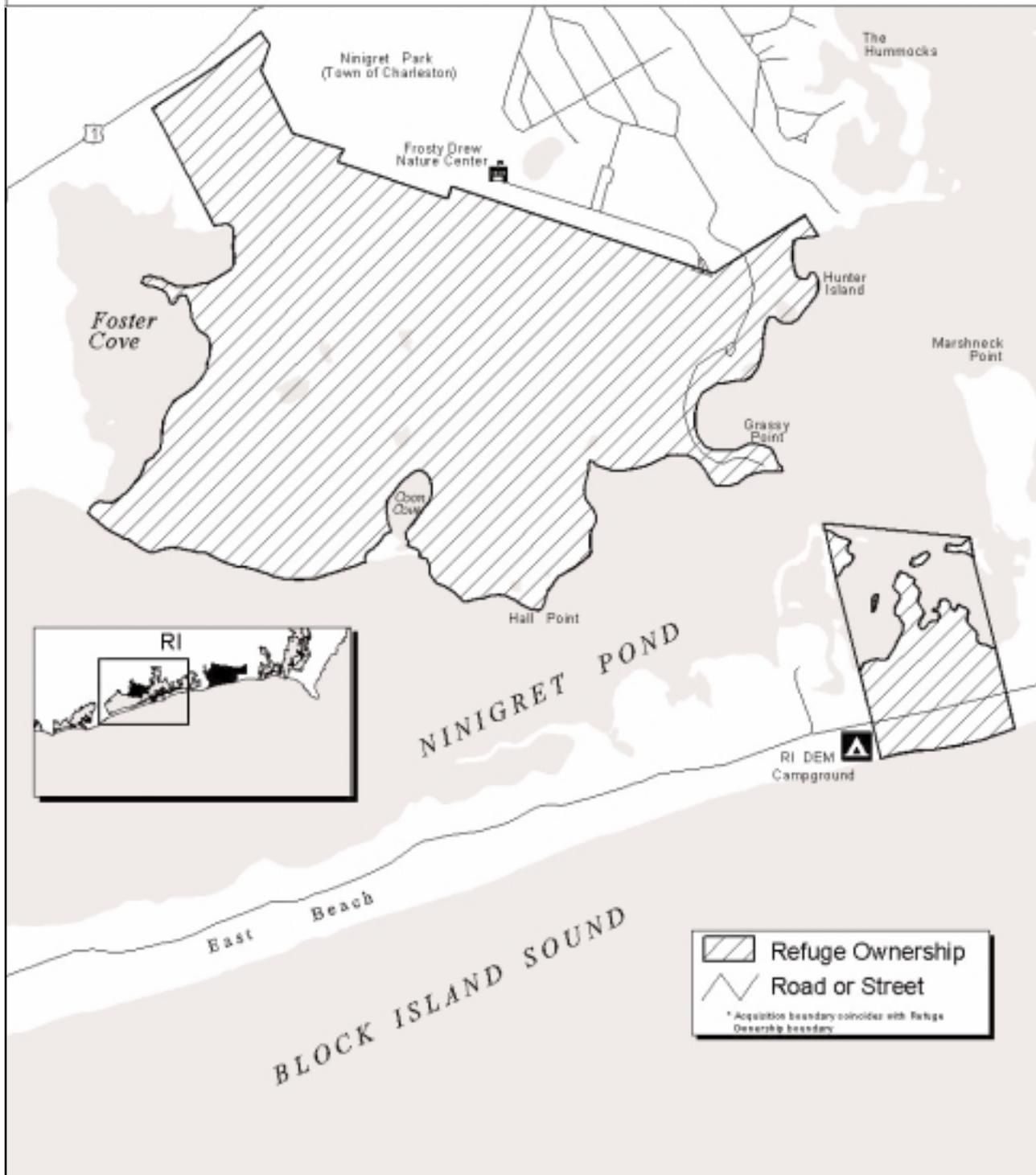
Table 1-2. Summary of land acquisition for Ninigret Refuge.

<i>Date</i>	<i>Acres Transferred</i>	<i>Acres Purchased</i>	<i>Comments</i>
1970	27.5	-	Navy
1979	316.4	-	Navy
1982	60	-	Navy
1984	-	3.31	-
1996	-	1.38	-

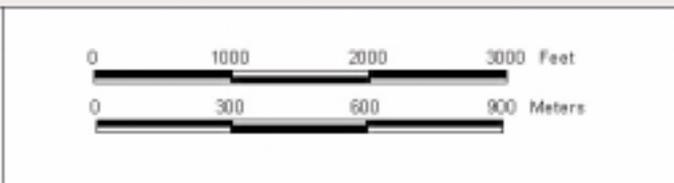
Total acreage = 409

Ninigret National Wildlife Refuge Current Service Ownership

Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 NAD83 Hydrography
 All other data provided by RSPWS, RI GIS
 & the Real Estate Right Coast Program.
 Map prepared for Rhode Island Wildlife Complex
 Comprehensive Conservation Plan,
 December 2000
 Not to be used for legal purposes.



Chafee Refuge

Originally established as Pettaquamscutt Cove National Wildlife Refuge, Chafee Refuge is the newest addition to the Refuge Complex. Located in the Towns of South Kingstown and Narragansett and centered in Middlebridge, the Refuge is mainly surrounded by private land. Most of its parcels border the Narrow River, a navigable public waterway.

The establishment purposes for Chafee Refuge are:

(1) To protect and enhance the populations of black ducks and other waterfowl, geese, shorebirds, terns, wading birds, and other wildlife using the refuge;

(2) To provide for the conservation and management of fish and wildlife within the refuge;

(3) To fulfill international treaty obligations of the U.S. respecting fish and wildlife;

(4) To provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation.

– 102 Stat. 3177, Nov. 5, 1988
(Public Law 100-610)

In 1988, Senator John H. Chafee proposed legislation designating 600 acres of Pettaquamscutt Cove and its associated uplands for the protection of black ducks, shorebirds, and other waterfowl. In 1996, another bill revised the Refuge acquisition boundary to include the 128-acre “Foddering Farm Acres,” purchased in 1997. In 1999, Congress recognized Senator John H. Chafee’s significant contributions to natural resource protection by renaming Pettaquamscutt Cove Refuge in his honor. Chafee Refuge currently includes 329 acres; an additional 398 acres have been approved for acquisition (see **Map 1-6**).

Table 1-3. Summary of land acquisition for Chafee Refuge.

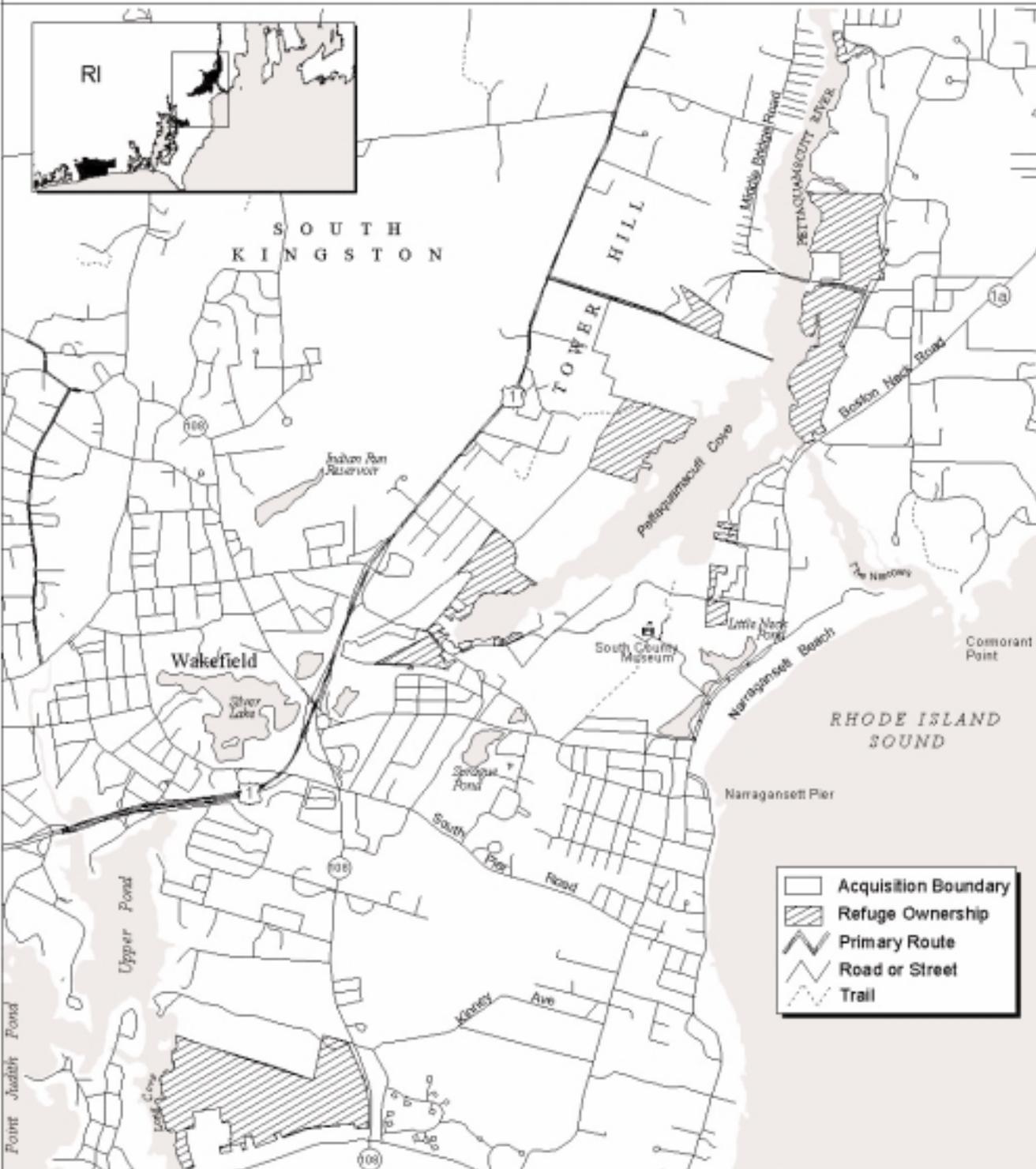
<i>Date</i>	<i>Gift Acreage</i>	<i>Acres Purchased</i>
1989	21.7	9.5
1990	-	44.2
1991	-	84.6
1992	-	3.7
1994	-	5.7
1995	2.6	11.7
1996	-	12.6
1997	0.6	111.4
1998	17.1	1.0
2000	-	1.2

Total acreage = 328

John H. Chafee National Wildlife Refuge

Current Service Ownership

Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 Roads & Hydrography
 All other data provided by USFWS, RIGIS
 & Co. New England/NIT Right Coastal Program.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan,
 December 2000
 Not to be used for legal purposes.



Sachuest Point Refuge

Sachuest Point Refuge is located in the Town of Middletown, Newport County, Rhode Island, about 23 miles southeast of Providence and 5 miles east of Newport (see **Map 1-1**). To the northeast, the Sakonnet River bounds the Refuge; to the southwest, Sachuest Bay. Located immediately northwest are a Town of Middletown campground, the Norman Bird Sanctuary, Gardiner Pond (supplying water to Newport), and Second and Third Beaches, owned and maintained by the Town of Middletown.

The establishment purposes for Sachuest Point Refuge are:

“...for the development, management, advancement, conservation, and protection of fish and wildlife resources.” and for

“(1) incidental fish and wildlife-oriented recreational development;

(2) protection of natural resources, and

(3) conservation of endangered or threatened species.”

– Fish and Wildlife Act of 1956 and Refuge Recreation Act of 1962

In 1970, The Audubon Society of Rhode Island donated 71 acres. The U.S. Navy transferred 50 acres in 1976, and 107 acres in 1979. An exchange of land between the Service and the Town of Middletown brought the Refuge total to 242 acres. Sachuest Point Refuge now owns all the land within its current, approved acquisition boundary (see **Map 1-7**).

Table 1-4. Summary of land acquisition for Sachuest Point Refuge.

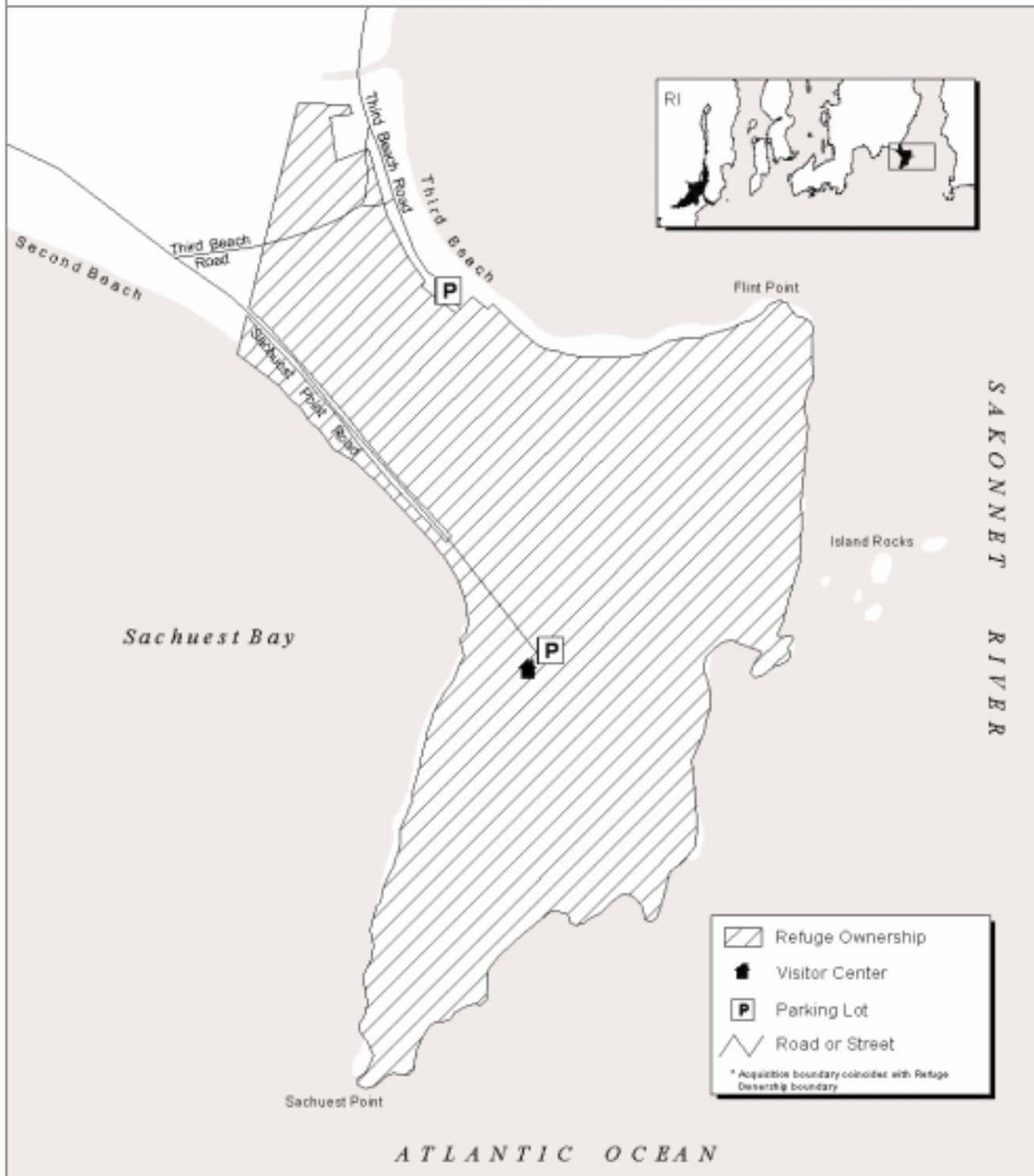
<i>Date</i>	<i>Gift or Transfer</i>	<i>Acres Purchased</i>	<i>Comments</i>
1970	71	-	Audubon Society of RI
1976	50	-	Navy
1979	107	-	Navy
1985	-	13.9	exchange w/ Town of Middletown

Total acreage = 242

Sachuest Point National Wildlife Refuge

Current Service Ownership

Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:

USGS 1:24,000 Roads & Hydrography
 All other data provided by USFWS, RI
 & So. New England NY Inlet Coastal Program.

Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan,
 December 2000
 Not to be used for legal purposes.

0 1000 2000 3000 Feet

0 200 400 600 Meters



Trustom Pond Refuge

Trustom Pond Refuge is located on the south coast of Rhode Island in South Kingstown, Washington County (see **Map 1-1**). The main body of the Refuge is bordered by private land and the community of Green Hill to the west; by Matunuck Schoolhouse Road to the north; and by private land to the northeast and east. Two privately owned parcels lie inside its northern boundary. East of its main body, the Refuge also owns a separate, 52-acre parcel, bordered by private farmland to the west and east, Matunuck Schoolhouse Road on the north, and Card Ponds Road on the south.

The establishment purposes for Trustom Pond Refuge are:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," and for

"(1) incidental fish and wildlife-oriented recreational development;

(2) protection of natural resources, and

(3) conservation of endangered or threatened species."

– Migratory Bird Conservation Act of 1929 and Refuge Recreation Act of 1962

In 1974, Mrs. Ann Kenyon Morse donated the first 365 acres to the Refuge. In 1980, an approved Environmental Assessment expanded the acquisition boundary to 1,000 acres. In 1982, The Audubon Society of Rhode Island donated 151 acres. The Refuge now includes 787 acres (**Map 1-8**). Now, with adjacent landowners and the Refuge cooperatively managing grasslands habitat, virtually all the land in its current acquisition boundary falls under conservation management.

Table 1-5. Summary of land acquisition for Trustom Pond Refuge.

Date	Gift or Transfer	Acres Purchased	Comments
1974	365	-	Ann Kenyon Morse
1982	151	-	Audubon Society of RI
1982	-	63	-
1985	10	-	-
1986	-	62	-
2000	-	136	conservation easement

Total acreage = 787

Trustom Pond National Wildlife Refuge Current Service Ownership

Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 1995 1:24,000 Road & Hydrographic
 ANS 447 422 provided by USGS, NOAA
 & So. New England Regional Coastal Program.

 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan
 December 2000
 Not to be used for navigation.



Step-Down Management Plans

The Refuge System Manual (Part 4 Chapter 3) lists more than 25 Step-Down Management Plans generally required on most refuges. Step-down plans describe specific management actions refuges will follow to achieve objectives or implement management strategies. Some require annual revision, others are revised on a 5- to 10-year schedule. Some require additional NEPA analysis, public involvement, and compatibility determinations before they can be implemented. A status list of Refuge Complex step-down plans follows.

These plans are current and up-to-date:

- Fire Management Plan, 1995 (Refuge Complex)
- Grasslands Management Plan, 1994 (Trustom Pond Refuge); will be incorporated into Habitat Management Plan (Refuge Complex)
- Continuity of Operations Plan, 1998 (Refuge Complex)
- Animal Control Plan, 1995 (Refuge Complex)

These plans are now in draft form or being prepared:

- Upland Management Plan (Ninigret Refuge); will be incorporated into Habitat Management Plan (Refuge Complex)
- Safety Program and Operations Plan (Refuge Complex)
- Law Enforcement Plan (Refuge Complex)

These plans exist, but we consider them out-of-date and needing revisions as indicated:

- Water Management Plan (Trustom Pond Refuge); need to expand to Refuge Complex
- Hunting Plan (Trustom Pond Refuge)
- Sign Plan (Refuge Complex)
- Disease Prevention and Control Plan (Refuge Complex)
- Croplands Management Plan (Trustom Pond Refuge); incorporate into Habitat Management Plan (Refuge Complex)

These step-down plans need to be initiated:

- Land Protection Plan (Refuge Complex)
- Cultural Resources Management Plan (Refuge Complex)
- Habitat Management Plan (Refuge Complex)
- Visitor Services/Wildlife-Dependent Recreation Use Plan (Refuge Complex)
- Fishing Plan (Refuge Complex)
- Wildlife Population Management Plan (Refuge Complex)
- Integrated Pest Management Plan (Refuge Complex)
- Invasive Species Management Plan (Refuge Complex)

Vision Statement

Early in the planning process, our team developed this vision statement to provide a guiding philosophy and sense of purpose for the CCP. It qualitatively describes the desired future character of the Refuge Complex through 2015 and beyond. We wrote in the present tense to provide a more motivating, positive, and compelling statement of purpose. It has guided, and will continue to guide program emphases and priorities at the Refuge Complex.



Brackish wetland. USFWS photo

"The Rhode Island National Wildlife Refuge Complex protects a unique collection of thriving coastal sandplain and beach strand communities, which represents some of the last undeveloped seacoast in southern New England. Leading the way in the protection and restoration of wetlands and early successional coastal habitats, the Refuge Complex insures long-term sustainability of migratory and resident native populations, and contributes to the recovery of threatened and endangered species. These refuges offer research opportunities and provide a showcase of habitat management for other landowners."



Moonstone Beach in winter. USFWS photo

"The Refuge Complex is the premiere destination for visitors to coastal Rhode Island to engage in high quality, wildlife-dependent recreation. Hundreds of thousands of visitors are rewarded each year with inspiring vistas and exceptional, barrier-free opportunities to view wildlife in native habitats. Innovative environmental educational and interpretive programs effectively promote better stewardship of coastal resources."

"Through partnerships and extensive outreach efforts, Refuge staff are committed to accomplishing Refuge goals and significantly contributing to the Mission of the National Wildlife Refuge System. This commitment will strengthen with the future, revitalizing the southern New England ecosystem for generations to come."

Refuge Complex Goals

Our planning team developed the following goals for the Refuge Complex after reviewing applicable laws and policies, regional plans, the Refuge Complex vision statement, the purpose of each refuge, and public comments. All the goals fully comply with and support national and regional mandates and policy.

The goals are intentionally broad, descriptive statements of purpose. They highlight specific elements of our vision statement that future Refuge Complex management will emphasize. Our planning team has identified Goal 1 as the top priority for the Refuge Complex; Goals 2-5 are not presented in any particular order.

Goal 1: Protect and enhance federal trust resources and other species and habitats of special concern.

Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

Goal 3: Establish a land protection program that fully supports accomplishment of species, habitat, and ecosystem goals.

Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

Goal 5: Provide Refuge staffing, operations, and maintenance support to effectively accomplish Refuge goals and objectives.

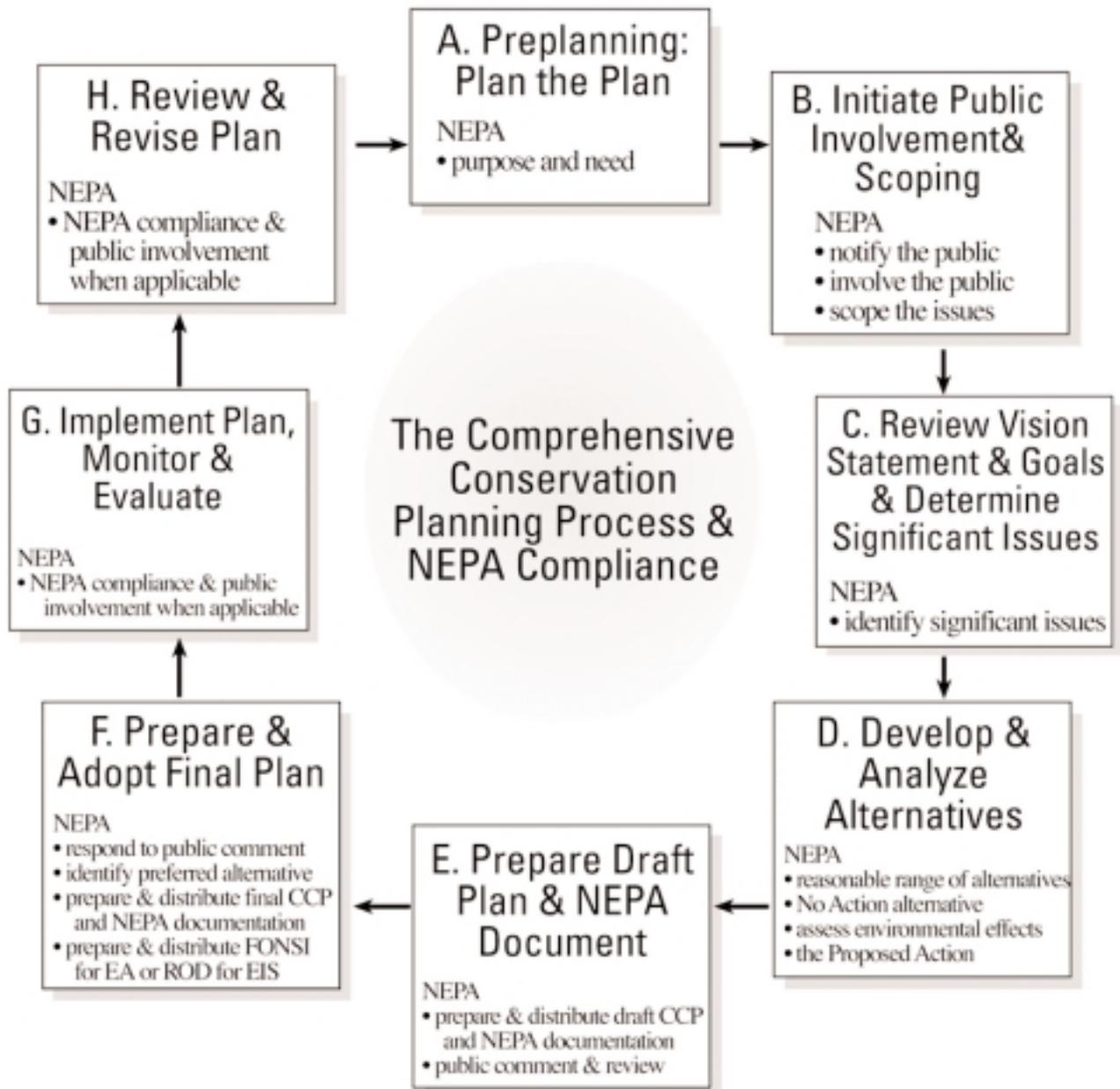
The Comprehensive Conservation Planning Process

Given the mandate in the Refuge Improvement Act to develop a CCP for each national wildlife refuge, our Northeast Regional Office identified nine refuges for initial planning during 1998 and 1999. We began the planning process for the Refuge Complex when its planning team of Region 5 and Refuge Complex staff first convened in February 1998. Figure 1-1 displays the steps of the planning process and how they incorporate NEPA requirements.

First, we focused on collecting information on natural resources and public use at the Refuge Complex, and developed its long-term vision and preliminary goals, including issues associated with each of its refuges. Next, we compiled a mailing list of more than 2,000 organizations and individuals, to ensure we would be contacting a diverse sample of the interested public.

Recognizing that not everyone could attend the Open Houses planned for April and May 1998, we developed Issues Workbooks in March, to encourage even more people to provide their written comments on topics related to managing the Refuge Complex. We offered the workbooks to everyone on our mailing list, including adjacent landowners, and made workbooks available at refuge headquarters, local libraries, and on the Internet from the Region 5 Home Page (<http://www.Northeast.fws.gov>). We received 150 completed workbooks. Those responses and public input at our meetings have influenced our formulating issues and developing alternatives on resource protection and public use.

Figure 1-1. *The Comprehensive Conservation Planning Process and NEPA compliance.*



In April and May 1998, we began a series of public meetings: five Open Houses in the communities of Middletown, South Kingstown, Charlestown, and Block Island invited public comments on goals and issues. We advertised the meetings through news releases, radio broadcasts, and notices to our mailing list. From 15 to 40 people attended each meeting. We also organized 15 informational meetings with state and federal agencies, non-profit conservation groups, town planners, conservation commissions, and sporting clubs.

The public recommended over 50 areas along the coast for possible inclusion in the Refuge System

Public responses suggested more than 50 additional areas where lands warranted protection, typically along the coast. We evaluated those lands for their potential as national wildlife refuges, using criteria such as the presence of threatened, endangered, or other trust species and their habitats, the presence of wetlands, our ability to manage or restore the areas, existing threats to their integrity, and their size and location, particularly their coincidence with the ABS discussed above. Each alternative in Chapter 3 discusses new, prospective land acquisition it would pursue.

Responses from Issues Workbooks and meetings have been influential in helping us formulate issues and develop alternatives related to resource protection and public use.

We distributed a Planning Update to everyone on our mailing list in September 1998. This newsletter summarized public comments from meetings and workbooks, described policy guidelines for managing public use on refuges, and identified the long-term vision and goals for the Refuge Complex.

Once the key issues had firmed up, we developed alternative strategies by May 1999 to resolve each one. We derived the strategies from public comment, from follow-up contacts with partners, or from the planning team. We distributed a second Planning Update newsletter in May 1999, updating everyone on our planning timelines and our decision to start a separate Environmental Assessment for a visitor center/headquarters. Since then, we have been compiling the information into this draft CCP/EA.

Our follow-up meetings in August and September 1999, developed and shared management alternatives. Chapter 6, Consultation With Others, presents a detailed summary of each public involvement activity.

Following a public 45-day review of this draft CCP/EA, we will compile and respond to public comments in an Appendix to a final EA. The final EA and CCPs will be submitted to the Regional Director for concurrence and approval of the preferred alternative. The Regional Director will then issue a decision in the FONSI. The final product of the CCP process is 5 stand-alone CCPs, one for each Refuge. Implementation of the decision can occur once the FONSI is signed and we publish a Notice of Availability of the final documents in the *Federal Register*. We will then distribute final documents to interested parties.

Each year, we will evaluate our accomplishments under the CCPs; more intensive monitoring is proposed for each program area, depending on the alternative selected. Monitoring or new information results may indicate the need to change our strategies. We will modify the CCP documents and associated management activities as needed, following the procedures outlined in Service policy and NEPA requirements. The CCPs will be fully revised every 15 years, or sooner if necessary.

Issues, Concerns, and Opportunities

From the Issues Workbooks, public and focus group meetings, and planning team discussions, we developed for each refuge a list of issues, concerns, opportunities, or any other items requiring a management decision. Then we sorted them into two categories: *Key issues*; and *Issues and concerns considered outside the scope of this analysis*.

Key issues, along with goals, form the basis for developing and comparing the different management alternatives. A range of opinions on how to resolve these key issues and meet goals generated the different alternatives presented in Chapter 3.

Issues and concerns considered outside the scope of this analysis do not fall within the scope of the Purpose of and Need for Action and the Decision to be Made. Our CCP/EA does not further address issues within this category.

Key Issues

Public and partner meetings and further team discussions produced the key issues briefly described below. (Refuges affected by the issue are identified in parentheses.)

1. *Protection of endangered and threatened species and other species and habitats of special concern (Refuge Complex).*

This is the most important issue facing the Refuge Complex. Protecting federally listed endangered and threatened species is integral to the fundamental mission of the Refuge System, and is a common purpose for which each of the five refuges was established. Other federal trust species are also of primary concern, including migratory birds, anadromous fish, and certain marine mammals.

In the forefront of this issue is management for piping plover, a federally listed species (threatened). Piping plover nest on the beaches at Trustom Pond Refuge and Ninigret Refuge, and on the Narrow River estuary near Chafee Refuge. Block Island Refuge has potential nesting habitat; so far, nesting attempts there have been unsuccessful.



American Redstart. USFWS photo

Threats from coastal development, disturbance by humans and pets, and predation are the major factors contributing to the species decline (Piping Plover Atlantic Coast Population, Revised Recovery Plan, 1996). Protecting piping plover presently requires an intensive effort by Refuge staff who monitor plover nesting, manage public use and access on beaches, control predators at nest sites, and provide environmental education and interpretation about the natural history of piping plover and barrier beach protection.

Consistently each year, predators are one of the most significant factors affecting chick survival in Rhode Island. Also, since 1993, humans have caused three incidents of piping plover nest destruction: two were acts of vandalism directed at destroying nests and eggs; the third may have resulted from joyriding on the beach. Campers often leave trash, which attracts predators to a nesting area, and often unleash their dogs, who chase adult plover off nests.

Some responses raised the continuing issue of restricting public beach use. Some feel we could do more to provide for piping plover by restoring habitat, or by working with the Rhode Island Coastal Resources Management Council (CRMC) to close beach intertidal areas.



Piping plover. *USFWS photo.*

Service staff help coordinate piping plover monitoring on nine beaches in southern Rhode Island, as well as on the refuges. This requires tremendous time and resources, both presently limited. Funding for plover work along the South Shore is inconsistent from year to year, and totally dependent on non-Service funding sources, typically foundation grants. However, the benefits derived are clearly evident in increased nesting attempts and productivity on many sites. The alternatives compare different strategies for protecting piping plover and managing important habitat areas on the South Shore.

Other federally listed species discussed are the seabeach amaranth (threatened), and sandplain gerardia (endangered), two plant species that may be considered for future reintroduction. The American burying beetle (endangered), which is known to breed on southern on Block Island, has yet to be found breeding on Refuge land. Chapter 3 includes alternatives for expanding the burying beetle population. Current levels of Refuge management also emphasize other federal trust resources: Neotropical migratory birds, waterfowl, and colonial wading birds. Chapter 3 describes different alternatives for managing them, as well.

Other species of special management concern

Appendix A lists species and habitats of special management concern. That list includes the status of all plants, wildlife, fish, and rare natural communities known to occur in Rhode Island that are federally listed as endangered or threatened, were candidates for listing, or are otherwise of management concern. Combined with location information, we used that list to identify additional land protection needs and opportunities. We know very little about many of these species' presence on or use of refuge habitats. The alternatives differ in their strategies for managing these species and habitats. Addressing this issue will help achieve Goal 1: Protect and enhance federal trust resources and other species and habitats of special concern.

2. *Restoration and maintenance of coastal sandplain natural communities, particularly grasslands (Refuge Complex).*



Northern waterthrush. USFWS photo.

While it is true that the Northeast landscape was primarily forested prior to rapid agricultural settlement in the 1800's, grasslands quickly became a dominant part of the landscape in the 19th century. Grassland-dependent species responded in kind and became established. Over the last several decades, however, grasslands and other early successional coastal habitats, including natural maritime and sandplain grasslands and shrublands, and agricultural fields and pastures, have been in rapid decline in New England due to a combination of development, changes in agricultural technology, succession to forest as farms were abandoned, and lack of a natural disturbance such as fire (Vickery 1997). In Rhode Island, the State's farmland dropped nearly 50 percent between 1964 and 1997, from 103,801 to 55,256 acres. An additional 3,100 acres of farmland will be lost in the next 20 years if current sprawl patterns continue (Common Ground 2000). As a result, few large, contiguous grasslands are left; only smaller, fragmented, and isolated grassland habitats remain (< 75 acres). These smaller grasslands are unsuitable for many focus species, including once-common grassland birds such as grasshopper sparrows and upland sandpipers. Grasshopper sparrows have declined by 69 percent in the past 25 years, according to Breeding Bird Survey data (Vickery 1997).

Other grassland-dependent species have declined dramatically as well. Many of Rhode Island's State-listed plant and animal species are grassland-dependent. Other grassland species continue to decline, and could be listed in the future.

Tremendous potential exists for refuge staff to become involved in restoring habitat on private lands. Grasslands restoration offers opportunities for our staff to provide technical expertise to local communities. The alternatives compare different levels of restoring and maintaining grassland habitats and providing technical assistance to private landowners. Addressing this issue will help achieve Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

3. *Protection and restoration of the beach strand ecological community (Block Island, Ninigret, and Trustom Pond Refuges).*



Trustom Pond Refuge. USFWS photo

Beach strand habitat is in critically short supply due to its loss and degradation by development and shoreline de-stabilization. Meanwhile, the demand for recreational uses in these areas intensifies. The result is an alarmingly high rate of habitat loss and the decline of virtually all beach strand plant and animal species. Federally listed species such as the piping plover, roseate tern, northeastern beach tiger beetle, and seabeach amaranth depend on this habitat. Alternatives include different strategies for protecting it. Addressing this issue will help achieve Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

4. Management of Trustom Pond (Trustom Pond Refuge).



Trustom Pond in winter. USFWS photo

Many consider Trustom Pond one of the jewels of Rhode Island's South Shore because of its aesthetic and ecological values. This 160-acre pond, which lies fully within Trustom Pond Refuge, is the only coastal pond in Rhode Island not flanked by development. Diverse waterfowl and wading birds use the pond year round. Many shorebird species use its shoreline during migrating and breeding seasons. Despite its apparent habitat values, important long-term concerns about water quality, invasive species, and the quality of shoreline habitat remain. Most of the sources suspected of contributing to increased nitrogen and coliform bacteria levels in Trustom Pond are off the Refuge.

Resolving these remaining concerns will require a cooperative, watershed-based approach. Although we focus on Trustom Pond, these same water quality and habitat degradation concerns pervade all the coastal salt ponds in Rhode Island. Cooperating with state agencies, local towns, land trusts, and non-governmental groups such as the Coastal Salt Pond Coalition, would provide opportunities for Refuge staff involvement and technical exchange to manage similar issues in other coastal salt ponds. Future management of Trustom Pond will be ecosystem-based, recognizing that the health of adjacent upland vegetation contributes to its viability and ecological integrity.

Some responses supported active management of Trustom Pond to improve its habitat quality for certain species; however, there could be trade-offs with other species. For example, increasing open mudflats to promote foraging habitat for piping plover and other shorebirds, may reduce the habitat quality for anadromous fish and certain waterfowl. These trade-offs need to be further evaluated and their implications understood. The alternatives evaluate different strategies to better understand and balance competing concerns and opportunities for resolving this issue. Addressing this issue will help achieve both Goal 1: Protect and enhance federal trust resources and other species and habitats of special concern, and Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

5. Protection and restoration of wetlands (Sachuest Point, Trustom Pond, Chafee, and Ninigret Refuges).



Brackish wetland. USFWS photo

The well documented values of healthy wetlands include fish and wildlife habitat, flood protection, erosion control, and water quality maintenance. Despite laws and regulations to protect them, wetlands throughout Rhode Island have been rapidly declining since the 1960's through conversion to agriculture, residential and industrial development. Rhode Island has developed more land in the last 34 years than in its first 325 years (Common Ground May/June 2000). Most recent sprawl occurs outside the urban areas, near the remaining wetlands.

Estuarine wetlands consisting of tidal salt and brackish waters are of particular concern. Wetlands were lost or diminished on both Ninigret Refuge and Sachuest Point Refuge as a result of military facilities and operations. A former landfill for the Town of Middletown lies in a wetland on Sachuest Point Refuge. Invasive species are dominating refuge wetlands and threatening their biodiversity.

Non-point pollution and sources off-refuge are impacting water quality and the health and productivity of these wetlands. The alternatives include different levels of management for restoring wetlands and for cooperatively managing entire watersheds. Addressing this issue will help achieve Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

6. Maintenance of water quality in the Narrow River (Chafee Refuge).

The Narrow River provides many values beneficial to a diverse array of wildlife and to the surrounding communities. Many wildlife species use the estuary and adjacent wetlands as a primary food source, a migratory rest stop, and as breeding, nesting, and spawning grounds.

The quality of both groundwater and surface water continues to deteriorate as a result of residential and commercial development within the watershed and the associated contribution of non-point pollutants such as individual septic systems. Since 1959, the Narrow River has failed to meet State standards for coliform bacteria, and parts of the river have been closed to shell fishing since 1979. Its degraded water quality threatens wetland habitats in Chafee Refuge, constraining their ability to fulfill the Refuge purpose. The alternatives evaluate different levels of involvement in cooperatively managing and protecting the watershed. Addressing this issue will help achieve Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

7. Control of invasive, non-native, or overabundant plant and wildlife species (Refuge Complex).



Autumn olive. USFWS photo

Each of the five refuges has an extensive distribution of invasive plant species. These plants are a threat because they displace native plant and animal species, degrade wetlands and other natural communities, and reduce natural diversity and wildlife habitat values. They outcompete native species by dominating light, water, and nutrient resources. Once established, getting rid of invasive plants is expensive and labor-intensive. Unfortunately, their characteristic abilities to establish easily, reproduce prolifically, and disperse readily, make eradication difficult. Many of these plants cause measurable economic impacts, particularly in agricultural fields. Preventing new invasions is extremely important for maintaining biodiversity and native plant populations. The control of existing, affected areas will require extensive partnerships with adjacent landowners, state, and local governments.

Thirteen invasive plant species affecting the natural communities within the Refuge Complex are considered of high management concern. The most prevalent are Phragmites, purple loosestrife, Asian bittersweet, autumn olive, and Japanese honeysuckle. Other species such as Japanese knotweed and multiflora rose are increasing on the Refuge Complex, and likely to become an issue soon. The alternatives consider different levels of management intensity and address management details such as partnership opportunities, budget and staffing needs, and species control methods.

Overabundant native species

Several wildlife species occur on the Refuge Complex that are known, or suspected to be, adversely affecting natural diversity. Issues surface when these species directly impact federal trust species or degrade natural communities. Mute swans are non-native, invasive species that aggressively drive native waterfowl and shorebirds away from nesting areas, compete with them for food, degrade water quality when they spend extended periods of time molting on coastal ponds, and are sometimes aggressive towards humans.

Native species such as deer, red fox, gull, and small predatory mammals such as mink, skunk, and weasel can be a problem when their populations exceed the range of natural fluctuation and the ability of the habitat to support them. Excessive numbers of deer are a threat to rare plant communities on the Refuge Complex, and excessive browse lines are evident on two refuges. Adjacent landowners are also concerned about deer impacts on landscaping, the increase in vehicle-deer collisions, and the threat of Lyme disease.

Red fox, gull, and some small mammals are voracious predators that can adversely impact other native wildlife populations. Occurrences have been documented of herring and black-backed gull, red fox, and weasel preying on piping plover and least tern, a State-listed species (threatened). Fox easily habituate to humans, and were being hand-fed at Sachuest Point Refuge. Many people fear fox and other mammals because they can carry rabies. These predators are particularly troublesome when their populations exceed natural levels. Control measures for each species are controversial, and may include lethal removal, visual and audio deterrents, or destroying eggs, nests, or den sites. The alternatives compare different strategies for managing these target species. Addressing this issue will help achieve Goal 1: Protect and enhance Federal trust resources and other species and habitats of special concern, and Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems.

8. Protection of biologically significant areas through acquisition and/or cooperative management (Refuge Complex).

Public meetings, partner meetings, and workbook responses expressed a great deal of support for the protection of additional fish and wildlife habitat in southern Rhode Island. That support runs across the State, as Rhode Islanders consistently vote ballot measures to maintain open space and protect fish and wildlife habitats. Many people mentioned that their support stems from their concern over the rapid pace of development on the South Shore. As we stated earlier, development in non-urban areas of Rhode Island has increased dramatically over the last 30 years. It is now the second most densely populated State in the country. One estimate predicts that current sprawl patterns will ensure the loss of all its rural areas before 2100 (Common Ground 2000). The Rhode Island Office of The Nature Conservancy has noted that the conservation actions taken during the next 5 to 10 years will be the most important for the majority of Rhode Island towns (The Nature Conservancy 2000).

This dramatic increase in development has changed land use patterns and practices, significantly modifying natural landscapes. As natural lands (those with sustainable native species populations and intact ecological processes) become isolated and fragmented into smaller pieces disconnected from other natural areas, their ability to support a full complement of native species is adversely affected. Cut off from larger populations, species and plant communities within these natural areas face the problems of limited genetic exchange, a decreased ability to support diverse populations, and lost capacity to recruit new individuals. Ultimately, the number of native species declines and exotic species gain a stronghold. It is precisely this diminished ability of natural areas to support diverse species with different habitat requirements that leads to a decline in biodiversity. While some species can tolerate fragmentation as they prefer “edge habitat,” many others, including “interior” dependent species, require larger, contiguous natural areas or functional corridors linking patches of natural habitat. This ability to protect and sustain larger natural areas and corridors, coupled with the protection of unique or rare species or communities, is critical to maintaining biodiversity.

A landscape or ecosystem approach to protecting land is also critical in the recovery of threatened and endangered species. Piping plover serve to illustrate this point. They have a fairly strong fidelity to certain nesting areas and typically return to them most years. Shifting of pairs between nesting areas has been observed when disturbances or habitat conditions affect their ability to nest. Barrier beaches are dynamic ecosystems, and their nesting conditions can change dramatically from year to year. While 1999 was a good nesting year on Moonstone Beach (Trustom Pond Refuge), this year the beach consists entirely of cobble with virtually no sand for nesting. The piping plover pairs there in 1999 appear to have shifted to the Ninigret Conservation Area. Without consideration of these shifts in habitat use across a landscape, management for these species would be ineffective.

Some individuals preferred that the Service acquire and manage federal trust resources, and that the Refuge Complex continue to acquire these sites. Others emphasized partnerships to cooperatively protect and manage important habitats not currently on refuge land. Still others recommended a combination of Service acquisition and cooperative management to provide the greatest long-term benefit to resources. At public meetings and in our workbooks, many responses suggested specific areas needing protection, particularly wetlands threatened by development. Some individuals we spoke with especially supported our acquiring land occupied by endangered or threatened species.

The alternatives offer various levels of Service land acquisition, ranging from lands within the currently approved acquisition boundaries only, to a considerable expansion of each refuge’s acquisition boundary. They also evaluate our increased involvement in cooperative land protection off-refuge. Addressing this issue will help achieve Goal 3: Establish a land protection program that fully supports accomplishment of species, habitat, and ecosystem goals.

9. Assurance of access to credible information about resources regarding the Refuge Complex to ensure management decisions are based on the best available science (Refuge Complex).

We need to determine and prioritize what information reasonably could be collected to facilitate decision-making using the best available science. In particular, many individuals expressed concern over the lack of information available to fully evaluate impacts to wildlife and habitats from excessive public use. Others questioned the effectiveness of management actions that have not been adequately monitored and evaluated. Several university researchers and other partners encouraged our staff to prioritize baseline inventory needs, establish monitoring protocols to better evaluate management actions, and identify information needed to determine each refuge's contribution to the ecosystem.

Implementing Service policy on ecological integrity (draft March 2000), will require us to ascertain the natural conditions for each refuge and identify the natural communities, species, and ecological processes that are rare, declining, or unique. Opportunities to cooperate in collecting this information could be developed once the priorities have been identified. The alternatives offer different levels of pursuing this information. Addressing this issue will help achieve all the Goals identified for the Refuge Complex.

10. Management of public use and access (Refuge Complex).

The Refuge Improvement Act and Service policy require our enhanced consideration of opportunities for six priority wildlife-dependent uses (see above). Some level of each occurs on the Refuge Complex. Only those uses that are compatible with a refuge's purpose may be allowed. According to Service policy, all refuges are closed to any use until it is formally opened through the compatibility determination process.

The act also directs refuges to terminate immediately or phase out as expeditiously as practicable, existing uses determined to be not compatible. Non-wildlife-dependent uses exist on all the refuges, and some have been occurring for years. Examples include jogging, sunbathing and swimming, bicycling, and dog walking.

Public meetings input and workbook responses make it clear that public use on refuges is extremely important to most people. More than 90 percent ranked environmental education and interpretation and wildlife observation and photography very high as desirable public uses. Rarely, however, was there consensus on other public uses or just how much of each type to allow. Public opinion spans the entire spectrum from those wanting to open up refuges to non-wildlife-dependent activities, to those who want to close refuges to all public use to maintain an undisturbed sanctuary for wildlife.

The alternatives compare different levels and combinations of wildlife-dependent public use. Addressing this issue will help achieve Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

11. Hunting (Refuge Complex).

Hunting surfaced late in the scoping process as a key issue, perhaps because, initially, few viewed it as a possibility on the Refuge Complex. This issue was raised by Service personnel, by RI DEM biologists, and by individuals both for and against expanding hunting opportunities on the Refuge Complex. Those in support primarily are interested in deer hunting on all refuges, waterfowl hunting on Chafee Refuge and Ninigret Refuge, and pheasant hunting on Block Island. Advocates of hunting refer to its inclusion as one of the six priority public uses that "...shall receive priority consideration in refuge planning and management" (Act 1997).

Parts of Trustom Pond Refuge, Chafee Refuge, and Block Island Refuge were hunted prior to acquisition by the Service. Only 20 acres of upland field on Trustom Pond Refuge remain open to hunting. The RI DEM has expressed its interest in any new opportunities for hunting because rapid residential development in Rhode Island is confining public hunting opportunities to fewer and fewer areas.

The Service views managed or administrative hunts in areas where there are overabundant deer populations as an effective tool for regulating them. Responses generally agree that the overabundance of deer is a concern in Rhode Island, reflected in increased numbers of vehicle-deer collisions, increased complaints about deer browsing on commercial and residential landscape plantings, visible impacts on native vegetation, and higher concern about contracting Lyme disease.

Those opposed to hunting cited concerns with public safety, disturbance and harm to other wildlife species, and the impact to visitors engaged in the other five priority public uses. The latter results from the likelihood that significant portions of the refuges, due to their small sizes and configurations, would be closed to other activities during hunting. Some expressed the opinion that the refuges should function as a sanctuary for all native species, and that hunting is incongruous with that function.

The alternatives offer varying levels of hunting opportunities, from no hunting at all, to opening four refuges during State-regulated seasons for deer, waterfowl, and pheasant. Addressing this issue will help achieve both Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems, and Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

12. Opportunities for environmental education (Refuge Complex).

Responses so frequently mentioned increasing environmental educational opportunities across the Refuge Complex that our planning team decided it warranted special recognition. More than 90 percent of the workbook responses ranked environmental education and interpretation as one of their top three interests. The alternatives compare different levels of environmental educational opportunities and the different levels of partnerships so integral to implementing them on each of the five refuges. Addressing this issue will help achieve Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

13. Provision of staffing, operations, and maintenance support sufficient to accomplish goals and objectives (Refuge Complex).

The Refuge Complex lacks adequate funding and personnel to provide the programs and services desired by the public and to effectively meet the goals for this CCP. The alternatives compare different funding and staffing levels based on their proposed management strategies for dealing with the issues. Addressing this issue will help achieve Goal 5: Provide Refuge Complex staffing, operations, and maintenance support to effectively accomplish Refuge goals and objectives.

14. Increasing the visibility of the Fish and Wildlife Service (Refuge Complex).

Our lack of visibility on refuges was brought up repeatedly at public meetings and in the workbooks. Many people felt strongly about the need for more refuge staff to be present during peak visitation to increase resource protection and improve visitor services. Other recommendations to increase visibility included more visitor contact stations, increasing wildlife interpretation and environmental educational opportunities, a better location for a headquarters office, developing a Refuge Complex visitor center, improving existing visitor facilities (e.g., kiosks, Sachuest Point Refuge visitor center, interpretive signs on trails, etc.), increasing support for a volunteer program, and increasing community involvement.

Some people expressed an interest in seeing refuge staff enforce public use policy more consistently. Others argued it was unnecessary for Service personnel to be armed while patrolling beaches. The alternatives compare different levels of promoting our visibility and providing these services. Addressing this issue will help achieve both Goal 2: Maintain and/or restore natural ecological communities to promote healthy, functioning ecosystems, and Goal 4: Provide opportunities for high quality, compatible, wildlife-dependent public use with particular emphasis on environmental education and interpretation.

15. *Need for improved facilities (Refuge Complex).*



The Refuge Complex lacks a facilities plan establishing current and future needs for staff operations and visitor services. Many of its current facilities are inadequate. Its headquarters does not have enough office space to accommodate even current staff, and the visitor services area is limited to one rack of literature in the reception area. The Sachuest Point Refuge visitor facility has structural problems and lacks interior exhibits. The alternatives compare opportunities for new or improved facilities to accommodate staff work space, increase the visibility of the Service and the Refuge Complex, and improve visitor services, including environmental education and interpretation. Addressing this issue will help achieve Goal 5: Provide Refuge Complex staffing, operations, and maintenance support to effectively accomplish refuge goals and objectives.

Issues Outside the Scope of this Environmental Assessment

Proposals for new, non-wildlife-dependent public uses

Service policy, as well as the Refuge Improvement Act, states that incompatible or non-wildlife-dependent recreation will be eliminated as expeditiously as practicable, with few exceptions. Our Refuge Manual (8 RM 9.1, 04/82) specifically mentions the need to phase out non-wildlife-dependent activities such as swimming, sunbathing, surfing, motorized boating, jogging, bicycling, and horseback riding. In-line skating (roller-blading), which became popular after the 1982 policy reference above, also falls into this category. Following public review and comment, we published our final compatibility policy in *Federal Register* Vol. 65, No. 202, pp. 62484-62496 (603 FWM 2) on October 18, 2000. That final rule provides additional detail on our process for determining which activities are compatible with a refuge's establishment purpose and management goals. This draft CCP/EA addresses non-wildlife-dependent activities that already occur on the Refuge Complex.

Some responses suggested golf courses, conference centers, schools, and aquaculture facilities as potential uses. This draft does not evaluate new proposals for these uses because their establishment would contradict the Refuge System mission, Service policy, and the purposes for which the refuges were established.



Prescribed burn at Ninigret National Wildlife Refuge
USFWS photo

Description of the Affected Environment

Part 1: Describing the Refuge Complex

- Landscape-level Features
- Socio-Economic Factors
- Refuge Complex Administration

Part 2: Describing the Refuges

- Block Island Refuge
- Ninigret Refuge
- Chafee Refuge
- Sachuest Point Refuge
- Trustum Pond Refuge

This chapter describes in two parts the physical, biological, socio-economic, and administrative environments of the Rhode Island National Wildlife Refuge Complex (Refuge Complex). It emphasizes those resources most affected by, or having the greatest influence on, the design of the management alternatives in Chapter 3.

Part 1 of this chapter describes the entire Refuge Complex: landscape-level features (landscape formation, climate, air quality, and ecosystem delineations), socio-economic factors, and administrative resources. Part 2 describes, for each of the five refuges in the Refuge Complex, physical, biological and cultural resources, and current public uses.

Part 1: Describing the Refuge Complex

Landscape-level Features

Landscape Formation



The movement of glaciers across New England created the land forms seen in Rhode Island today. The last of those great ice sheets occurred during the Wisconsin glacial period. Approximately 15,000-20,000 years ago, the glacier was in a state of equilibrium, where the melting rate of ice equaled the glacial rate of movement (Bell 1985). As the climate warmed 12,000-15,000 years ago, the glacier began its retreat, depositing pronounced land forms along its outermost edge. The southern coast of Rhode Island, including Block Island, is the farthest point the Wisconsin glacier reached in its southeastern frontal movement. The retreating glacier deposited rocks pushed by the front of its ice sheet in piles called moraines. These terminal or end moraines formed sinuous ridges up to 200 feet high. Block Island is part of the terminal moraine that includes Nantucket and parts of Long Island.

A second prominent moraine lies inland, the low ridge referred to as the Charlestown or Watch Hill moraine, stretching east to west parallel to U.S. Route 1. Glacial action also created other features in today's landscape: recessional moraines, outwash plains, kettle hole ponds, glacial lake deposits, deltas, and submerged gravel shoals. Prominent headlands like Sachuest Point are composed of glacial till, a mixture of silt-sized grains to boulder-sized deposits by the melting glacier.

Melting ice sheets caused the sea to rise rapidly across Block Island and Rhode Island Sounds until it reached its present level approximately 4,000 years ago. Wave action parallel to the shore continued to erode glacial deposits, creating the barrier spits. As the spits formed, they almost entirely sealed off the low-lying areas between the headlands and the ocean, forming coastal lagoons connected to the sea by narrow inlets. These became the coastal salt ponds we see today. Through the 1700's, all of the coastal salt ponds had direct, seasonally open connections to the ocean (RI CRMC 1984). The effects of erosion through time have shifted the salt ponds and barrier spits gradually landward (RI CRMC 1998).

The bedrock formations of southern Rhode Island include the Blackstone series of metamorphic rock along its southern coastal border (including most of Westerly, Charlestown and South Kingstown), granite rock of various ages (including most of Narragansett and Middletown and parts of Westerly and Charlestown), and Pennsylvanian sedimentary rock in most of south central Rhode Island (including Richmond, much of South Kingstown, and most of Hopkinton). Most of the soils around the refuges are fine sandy loams or silt loams.

Historical Influences on Landscape Vegetation



Historic grasslands. *This early photo from the Charlestown area shows what historic grasslands may have looked like. Photo courtesy of Cross Mills Public Library.*

The upland forests of southern Rhode Island are classified by Kuchler (1964) as oak-hickory forest; while most of northern Rhode Island is classified as oak-pitch pine forest. Historic land use practices promoted this forest type.

As early as 12,000 years ago, Native Americans began occupying the area. Documented evidence places the first intensive occupation of the salt pond region during the late Archaic period (5,000 to 3,000 years ago). Native American camps from more than 4,000 years ago are known to have existed at one location along the shore of Ninigret Pond. However, societies of that time were primarily hunter-gatherer with little agriculture; broad changes to landscape vegetation probably did not occur.

During the Woodland Period 3000-450 years ago, larger, semi-permanent or recurrently occupied camps became coastal settlements. Fortified villages are known to have existed in some locations. Maize horticulture became prominent, which likely resulted in small clearings (USFWS 1999). Larger clearings and burnings to control the movement of deer and upland birds may have occurred, and the first pronounced clearing of land along the coast for settlements, game management, and agriculture. Much of this land was cleared by cutting and burning, which favored resprouting by hardwood species like oak, hickory, and red maple.

The role fire may have played in shaping landscape vegetation is not well known. Evidence of fire has been observed in charcoal layers at Ninigret Refuge. Soil cores dug at most points on the Refuge reveal charcoal below the historic farmers plow zone, approximately 10 inches soil depth. The dates attributed to these fires, coupled with their locations, suggest early Native Americans used fire extensively and purposefully.

Although small areas of land were cleared and more or less permanently settled by early Native Americans, it was European settlement and expansion in the 1600's that exponentially escalated the conversion of forests to agriculture. The eighteenth century Rhode Island plantation era "...required massive land clearing of the forests that had dominated the landscapes for the last 8,000 years" (USFWS 1999). During the mid-nineteenth century, an estimated 85 percent of southern New England was converted to field and pasture. Any woods remaining often were managed for firewood (Jorgensen 1977).

Block Island is similar in its prehistory to the mainland, except that occupation most likely began in the Middle Archaic period (7,000 to 5,000 BP). Human impact on the island's vegetation began with Native American settlement and accelerated during the 1600's, with "...European practices of land clearing for pasture and agriculture and the construction of fishing ports and associated villages" (USFWS 1999). Town records indicate the dominant species of trees on the island before extensive land clearing included white oak (*Quercus alba*), black oak (*Quercus velutina*), hickory (*Carya spp.*), and eastern red cedar (*Juniperus virginiana*). Beech (*Fagus grandifolia*), tupelo (*Nyssa sylvatica*), red maple (*Acer rubrum*) and sassafras (*Sassafras albidum*) were present, but less common (Hammond 1998). A detailed report on the archeological history of the Refuge Complex is available from the Refuge Complex office on request (Jacobson USFWS).

Contemporary Influences on the Landscape

The major natural disturbances affecting the coastline today are hurricanes and winter ice-storms. Hurricanes have the greatest impact, by far. The straight border of barrier beaches separated from the mainland by tidal wetlands and coastal salt ponds characterizes a coastline influenced by frequent storms. Wind and waves pick up loose sand and sediment and move it along the shoreline or back out to sea, allowing occasional overwash of barrier beaches and breaching of coastal ponds. Overwash, tidal currents, longshore currents, and rip currents are all mechanisms transporting sediment along the barrier beaches (RI CRMC 1998).

Fall and winter storms combining wind, rain, and waves are the predominant physical process shaping this landscape today. "Nor'easters" are well known along the New England coast in winter; winds generated offshore from the southeast, can actually be more destructive to the south shore, because of its exposure to the open ocean. The draft Salt Pond Region Special Area Management Plan describes the geologic, wave, and wind action for the South Shore, including details on how sediment movement constantly reshapes this dynamic landscape (RI CRMC 1998).

The Great New England Hurricane of 1938 was the most recent 100-year storm, one of immense power along the coast. Not only did winds reach speeds up to 240 miles per hour, but also a spring high tide created a storm surge between 10 and 15 feet. Storms of this magnitude are suspected to have occurred only four other times in recorded history: 1635, 1683, 1815, and 1821 (Bell 1985). Smaller hurricanes are less powerful but more frequent than the hurricane of 1938. Hurricanes in 1944, 1954, 1955, 1960, 1976, and Hurricane Bob in 1991 each left its mark on the coastline.

Human influences on sustaining the form and function of coastal landscapes and ecosystems over the long term are predominantly negative. Attempts to stabilize the beach system by constructing jetties or breach ways and planting beach grass have greatly affected the natural dynamics of this system by interrupting the natural flow of waves and sediment. In fact, the breach ways connecting the ponds to the ocean and one pond to another are the single greatest human impact on the ecology of coastal ponds (RI CRMC 1984).



Restoring old runways at Ninigret Refuge. *USFWS photo*

Military installations directly impacted the landscapes that include Ninigret Refuge and Sachuest Point Refuge. From the 1940's through the 1960's, Ninigret Refuge was a U.S. Naval Auxiliary Landing Field. More than 70 acres of tree and shrub vegetation were cleared and maintained as asphalt runways and taxiways. Adjacent areas maintained as grasslands were planted with non-native species like larch and autumn olive. Between 1945 and 1973, 107 acres at the center of the Sachuest Point peninsula were used as an Army Coastal Defense site and a Navy firing range. Around a more recent Naval communications center, mowing and the use of herbicides maintained the vegetation in a low shrub-grasslands structure. A separate report on the history of the Sachuest Point Naval facility, entitled "Historical Perspectives on Establishing Sachuest Point Refuge" (Walker 1995), is available upon request at the Refuge visitor center.

Introducing non-native, invasive plants, diverting or draining coastal wetlands for development, converting uplands for residential use, and spilling oil are other significant human impacts on the coastal landscape. On Block Island, studies in 1990 and 1996 implicated boat sewage discharge in contributing to excessive fecal coliform bacteria levels in Great Salt Pond. Recent studies indicate that the greatest threats to Rhode Island's estuaries and coastal salt ponds are septic systems and road runoff (RI DEM 1996). More studies are needed to establish the extent to which each of these factors influences Refuge Complex ecosystems.

On Rhode Island's upland landscape, a combination of management and natural succession has allowed forests to make a comeback. The State Division of Forest Environment estimates that 300,000 acres of privately owned forest plus 45,000 acres of State-managed forest make up 45 percent of the State's land area. Their estimate places 80 percent of the privately owned forest in tracts from 1 to 10 acres in size, which are difficult to manage as forest and are rapidly being converted to residential areas (RI DEM 1996).

Ecosystem Delineations

As described in Chapter 1, we emphasize an ecosystem approach to conservation, typically using large river watersheds to define ecosystems. Rhode Island falls within our Connecticut River/Long Island Sound Ecosystem (**Map 1-3**).

Another commonly used delineation of ecosystems was developed by Bailey (USDA 1978, expanded 1995). These ecologically based map units often are used in landscape-level analyses. An ecoregion is first divided into a domain, then a division, a province, a section, and a subsection. Each level defines in greater detail its geomorphology, geology, soil, climate, potential vegetation, surface water, and current human use. Each of these resource attributes has implications for resource management. For example, opportunities to restore native grasslands may be limited by soil types, potential vegetation, and the extent of human impacts on the natural environment. Rhode Island falls within the Humid Temperate Domain, Hot Continental Division, Eastern Broadleaf Forest Province, and Lower New England Section.

Climate

Cold winters and warm summers with a moderating ocean influence characterize Rhode Island's climate. Winter temperatures average 30° F, with lowest temperatures ranging between -10° F and -20° F. Summer temperatures average 70° F, and peak in the 90s. Annual precipitation averages 44 to 48 inches, evenly distributed throughout the year. Thunderstorms occur throughout the summer (USFWS 1989).

Air Quality

The Clean Air Act establishes Class I, II, and III areas with limits on the amount of "criteria air pollutants" that can exist in pre-defined geographic areas. Examples of criteria air pollutants are smog (primarily ground-level ozone), particulate matter, and carbon monoxide. Class I areas allow very little additional deterioration of air quality (e.g. Wilderness Areas); Class II areas allow for more deterioration; and Class III areas allow even more. All of Rhode Island is currently classified as a Class II area. The U.S. Environmental Protection Agency (EPA) has designated the entire State a serious non-attainment area for ozone. That designation resulted in stricter automobile emissions standards designed to reduce emissions by 24 percent between 1990 and 1999.

Socio-economic Factors

The Refuge Complex lies close to some of the largest population centers on the east coast. The New York City metropolitan area, population 8.5 million, is 2.5 hours to the southeast. Metropolitan Boston, population 3.2 million, is 2 hours to the north. Hartford, with a population of 140,000, is 1.5 hours to the northwest, and Providence, population 161,000, is 45 minutes to the north (U.S. Census Bureau 1996 estimates; 1990 U.S. Census).

According to those estimates, the population of Rhode Island is about 1 million; 94 percent live in metropolitan areas (cf. the national average of 80 percent) and 6 percent in rural areas. South County, which includes Ninigret Refuge, Trustom Pond Refuge, and Chafee Refuge, has the fastest growing population and the highest number of building permits issued annually (RI CRMC 1998). South County population figures between 1990 and 1996 increased 7.4 percent, 4.6 percent, and 5.3 percent respectively in Charlestown, Narragansett, and South Kingstown, while Middletown's population decreased by 1.4 percent. The Town of New Shoreham, which includes Block Island, had a population increase of 10.8 percent. The population for the entire state of Rhode Island decreased by 1.3 percent over the same period (<http://www.riedc.com>).

The Refuge Complex directly contributes to the economies of Charlestown, South Kingstown, Narragansett, Middletown, and New Shoreham through refuge revenue sharing payments. The Federal Government does not pay property tax; it does pay refuge revenue sharing directly to cities and towns each year, based on the fair market value of refuge lands. The revenue sharing formula calculates three-quarters of 1 percent of the fair market value of refuge lands as the maximum amount payable each year. An appraisal updated every five years keeps their fair market value current. The actual amount of revenue sharing paid each year varies, depending on what portion of the maximum amount Congress appropriates that year (rarely the maximum). **Figure 2-1** depicts refuge revenue sharing payments to those towns for the fiscal year 2000.

The University of Rhode Island Department of Resource Economics (Spring 1997) reports that travel and tourism is the State's fastest growing industry. In 1996, it generated \$1.7 billion. The number of visitors to the State in 1997 increased at a rate twice the national average. Also in 1997, Rhode Island's services industry, which includes those in health, business, and education, comprised the largest wage and salary employment at 34 percent (RI EDC 1997). Between 1987 and 1997, the services industry increased by 37 percent, while the manufacturing industry decreased by 37 percent.

In all the communities surrounding the refuges, travel and tourism and the services that support them contribute substantially to local economies. According to Ann O'Neill, President of the South County Tourism Council (O'Neill 1999), the tourist season lasts from April through October, with peak activity during the summer months. Responses to our workbooks confirm that beaches and water-associated recreation are the primary attractions for visitors with destinations along the Rhode Island coast.

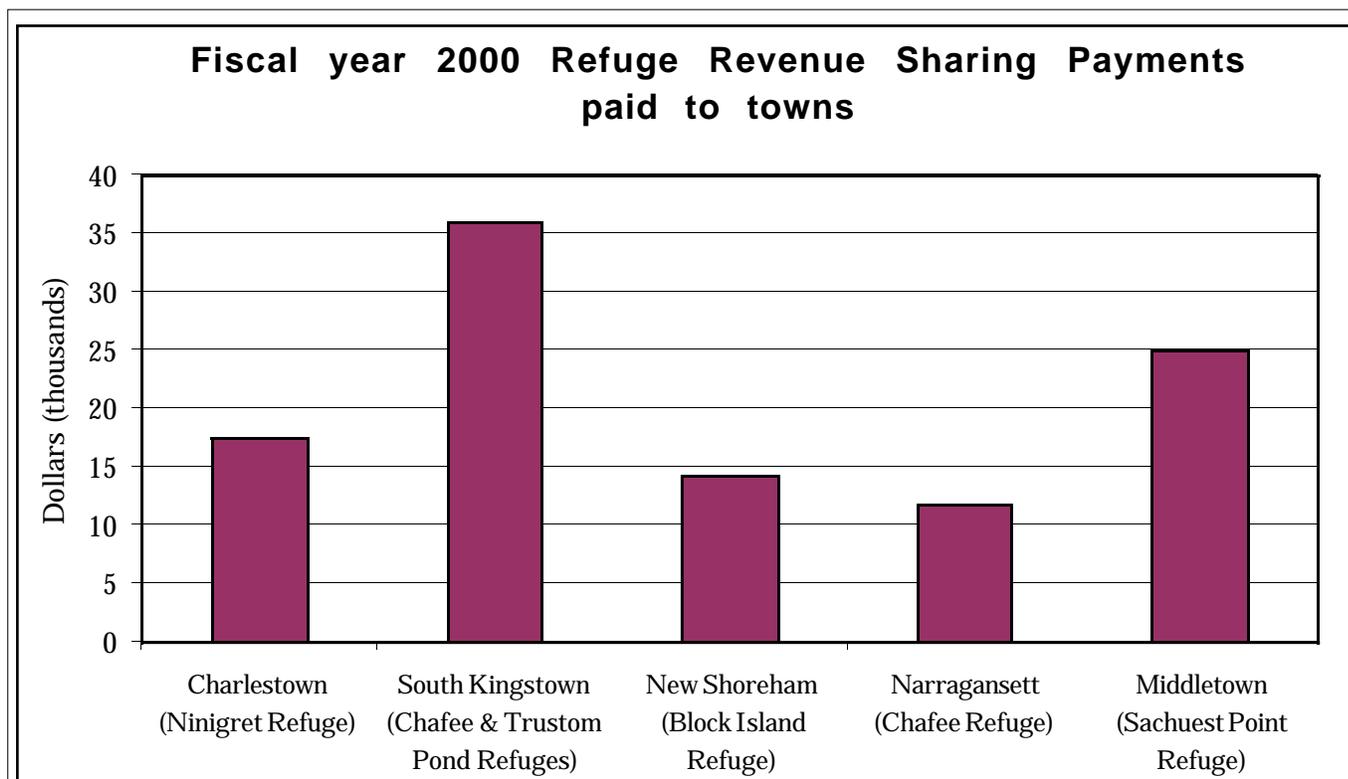


Figure 2-1. *Refuge Revenue Sharing Payments made to towns in 2000.*

Current travel and tourism literature does not feature the Refuge Complex. According to Ms. O'Neill, its refuges are not well known as tourist destinations, although many visitors discover them during their visit and enjoy the scenery and open space they provide. They are small enough to explore in one day, and generally do not prompt an additional night's lodging. Ms. O'Neill stated that, since the Tourism Council is trying to showcase a greater mix of outdoor recreational opportunities in South County, the Refuge Complex will figure more prominently in future promotional material.

The greatest contribution by the Refuge Complex to the local economy comes from the values attributed to the preservation of open space (NPS 1992). We represent those values using three indicators, below: Cost of Community Services; Property Values; and Public Willingness to Pay.

Cost of Community Services compares the cost per dollar of revenue generated by residential or commercial development to that of revenue generated by an open space designation. On the one hand, residential development expands the tax base, but the costs of increased infrastructure and public services (schools, utilities, emergency services, etc.) often offset any increase in revenue. On the other hand, undeveloped land requires few town services and places little pressure on the local infrastructure. The cost per dollar of revenue generated by commercial land typically falls between those of residential and open space.

The American Farmland Trust (1989, 1992, and 1993) and the Commonwealth Research Group (1995) evaluated community revenues and expenses associated with open space vs. residential and commercial development. All available information on the New England States shows that open space and commercial development produced more revenues than costs, while the opposite was true for residential land.

Conversations with local realtors and appraisers helped us evaluate the refuges' influence on property values. Two South County realtors and one realtor/appraiser confirmed that properties adjacent to refuges generally are valued higher (Gross, et al. 1998). That value is realized through increased sales price/acre in properties adjacent to a refuge, compared to otherwise similar properties, and by how quickly those properties sell. Properties with views protected by their proximity to a refuge exhibit an even greater difference. All the realtors estimated, but none with any certainty, that properties adjacent to refuges may realize from 1- to 4-percent increases in property value. All the realtors we spoke with use a property's adjacency to a refuge as an important advertising asset.

Public Willingness to Pay is a method for estimating the monetary value of ecosystem goods and services by determining how much the public would be willing to pay, either in taxes, fees, or opportunity costs, to preserve ecosystem values. In Rhode Island, where coastal ecosystems are threatened by development-at-large, we have used Willingness to Pay to estimate the value of open space preservation.

Rhode Islanders consistently and overwhelmingly vote for bond measures to protect open space. Local and State-wide bond measures passed in 1985, 1986, 1987, and 1989, invested more than \$100 million in acquiring land for recreation and open space. A State-wide bond in 1998 passed an additional \$15 million specifically for protecting open space (RI CRMC 1998).

Refuge Complex Administration

Staffing and Budget

Annual budget appropriations are highly variable, and commensurately affect our staffing levels. **Table 2-1** summarizes budget and staffing levels from 1995 to 1999. Fluctuations reflect funding for special projects, moving costs for new employees, or large equipment purchases. Most of the funding is earmarked; very little discretionary funding is available.

Land Acquisition

The Director of the Service must approve all lands to be acquired, and they must be acquired in compliance with NEPA. With the establishment of a new refuge, land acquisition planning typically identifies important wildlife habitat. An environmental assessment establishes an acquisition boundary, with approval to acquire land within that boundary. Transfers of land from the Navy established Ninigret and Sachuest Point Refuges. No additional lands have been identified for acquisition. Only Block Island, Chafee, and Trustom Pond Refuges have unacquired lands within their acquisition boundaries (see Chapter 1). Recent land acquisition at the Refuge Complex has focused on those three refuges. The Refuge Complex has acquired a total of 1,717 acres through transfers, donations, and purchases.

Table 2-1. *Refuge Complex staffing levels and budgets between 1995 - 1999.*

<i>Fiscal year</i>	<i>Operations</i>	<i>Maintenance</i>	<i>Full time staff</i>	<i>Seasonal staff</i>
1995	\$216,299	\$85,700	7	3
1996	355,715	23,900	7	3
1997	350,700	97,700	8	4
1998	428,400	171,000	8	4
1999	441,900	28,000	9	2

Resource Protection and Visitor Safety

Law enforcement officers, with full authority to enforce federal regulations, are required to ensure resource protection and visitor safety. Three permanent refuge staff have been assigned collateral duties for law enforcement at any time during the course of refuge operations, but those collateral duties draw staff time and resources away from other important programs. We typically hire up to three seasonal staff with law enforcement authority each year.

During the past 5 years, formal notices of violation averaged 15 per year. They typically involved vehicle and pedestrian trespass, vandalism, and waterfowl hunting in closed areas. Well over 100 verbal warnings are also given each year, typically for inadvertently walking or driving in closed areas, littering, walking dogs in a closed area or off-leash, bicycling in closed areas, and digging plants. In 1993, a Trail Warden program began using volunteers to assist in documenting violations. Wardens also inform visitors of public use policy and permitted activities.

Refuge Complex Office

The Refuge Complex office lies in the Shoreline Plaza strip mall in Charlestown. In addition to housing our staff, it also houses our Division of Ecological Services Southern New England/New York Bight Coastal Ecosystem Program five-member staff, an Atlantic Coast Joint Venture staff person, and Friends of the National Wildlife Refuges of Rhode Island.

We have rented the office and property from a private individual through a General Services Administration contract since 1985. But we have always considered the location temporary for its several inadequacies. First, it does not comply with the accessibility requirements of the Americans With Disabilities Act (ADA). Second, the building lacks space for visitor contact services, environmental education, or interpretation. Visitor contact space is limited to one rack of pamphlets displaying information on the refuges. Third, storage space is wholly inadequate, and personal work space and library space are very tight.

Also, the current location is not readily visible or easily accessible for most visitors to South County. They regularly complain about getting lost on the way to the office. Signs on U.S. Route 1 and to the Refuge Complex office, as well as directional signs at all five refuges are inadequate, and do not meet the sign standards of the Refuge System.

The Trustom Pond Refuge Master Plan (1988) includes a decision to construct a new Refuge Complex headquarters and public contact center. It selects a location adjacent to the Refuge Complex maintenance facility on the Refuge, because that location best met the site selection criteria, including a location on-Refuge where "...a large amount of management activity (present and projected) is planned," and its proximity to a public road. An architectural firm completed a conceptual design, but the project was never funded.

In 1997, the Transportation Equity Act for the 21st Century (otherwise known as TEA-21) earmarked \$5 million to fund a combined Refuge Complex office and visitors center for refuges staff and the other programs co-located in the strip mall. We are now investigating prospective locations for the new visitor center and office. A site selection committee has detailed criteria for evaluating prospective sites:

- On or easily accessible from U.S. Route 1
- Reasonable development costs
- Proximity to refuges and administrative buildings
- Low ecological and aesthetic impacts
- Sufficient acreage to support the facility and contribute to land protection efforts
- Land use compatibility
- Land ownership and availability
- Ability to support onsite environmental education

Once the committee has determined potential sites, an environmental assessment will assess the impacts of the project. A Visitor Center Project Identification Document completed in August 1999 will guide the design of the building.

Partnerships

The Refuge Complex staff is proud of its long history of partnerships. More than 45 partnerships have supported the refuges, including four universities and colleges, numerous departments within Rhode Island State government, town administrations, conservation commissions, school districts, conservation groups and land trusts, environmental education centers, historic preservation groups, adjacent landowners, and other federal agencies. These partnerships have resulted in biological research, cooperative management of threatened and endangered species and declining habitats, protection of open space, and environmental education programs.

Refuge staff were particularly delighted by the establishment in 1998 of a "Friends of the National Wildlife Refuges of Rhode Island" group. The Friends are a non-profit advocacy group dedicated to supporting Refuge Complex goals within the community through public education and interpretation, project funding, and volunteer coordination. Their mission is "...[to be] devoted to the conservation and development of needed healthy habitat for flora and fauna at the National Wildlife Refuges of Rhode Island and to the provision of a safe, accessible ecological experience for our visitors...."

Volunteer Program

Volunteers are vital to accomplishing all Refuge Complex goals. For example, 65 volunteers donated more than 6,000 hours in 1998 to assist in environmental education programs, monitoring public use, maintaining facilities, and managing habitat and species. This translated into more than \$70,000 in benefits to the refuges. Volunteers are also largely responsible for staffing and maintaining exhibits at the Sachuest Point Refuge Visitor Center and for staffing the visitor contact station at Trustom Pond Refuge.

In 1999 we hired a permanent staff Volunteer Coordinator to improve the quality of the program through better coordination, supervision, and training of volunteers, and to improve outreach to the local community. The coordinator compiles and distributes a quarterly newsletter to volunteers, refuge partners, and interest groups, keeping them informed about management activities and upcoming interpretive programs on the Refuge Complex.

Facilities and Maintenance

The Beane Point cabin on Block Island Refuge, the Sachuest Point Refuge Visitor Center, and the storage and maintenance buildings on Trustom Pond Refuge are the primary facilities on the Refuge Complex, and require the most extensive maintenance. Maintaining roads, parking lots, and trails are also a recurring need on each refuge. Appendix F lists current maintenance needs.

Through disbursements under the Transportation Equity Act of 1997, in 1998 the Refuge Complex was awarded \$75,000 for improving road access and \$300,000 for removing asphalt runways at Ninigret Refuge; \$200,000 for improving access to Sachuest Point Refuge; and \$500,000 for improving the Sachuest Point Refuge Visitor Center.



Waterfowl casualties of the North Cape Oil Spill. *USFWS photo*

Coordinating Oil Spill Response

In 1977, the Refuge Complex Manager was designated the interagency Oil Spill Field Response Coordinator for the eastern coastline from the Connecticut/New York State line up to and including Buzzards Bay in Massachusetts. In 1992, that area of responsibility was redrawn to correspond with the U.S. Coast Guard Captain-of-the-Port Providence Area. Between 1978 and 1996, 16 oil spills occurred in that area.

The largest of the 16 was the 1996 North Cape Oil Spill. Approximately 828,000 gallons of #2 heating oil spilled just offshore from Trustom Pond Refuge. The National Oceanic and Atmospheric Administration, Department of the Interior, Rhode Island Department of Environmental Management, and the Service completed a joint Restoration Plan and Environmental Assessment (November 1999). A copy is available at the Refuge Complex office.

Contaminants

Contaminant sites occur on Trustom Pond Refuge (one site), Sachuest Point Refuge (one site), and on or immediately adjacent to Ninigret Refuge (four sites). Contaminant issues have been coordinated by a combination of refuge staff, our contaminant biologists, our Pollution Control Office, the EPA, U.S. Army Corp of Engineers, and RI DEM. Five of the sites are listed in the EPA Comprehensive Environmental Response, Compensation and Liability Information System database (CERCLIS) (see below).

Contaminants – Sachuest Point Refuge

The Town of Middletown operated a municipal landfill at Sachuest Point from 1958 to 1973. The site then operated as a transfer station until 1975. The 21-acre landfill was constructed in a coastal salt marsh and barrier beach system between Second Beach and Third Beach on the east side of Sachuest Point. It was listed on the Federal Facilities Compliance Docket and published on February 12, 1988, in Federal Register Volume 53, Number 29 (CERCLIS No. RI4143690010).

In 1994, Refuge staff completed a Preliminary Assessment of the ecological and human health risks associated with the site, providing the basis for EPA to score the site for inclusion in the EPA Superfund Program National Priority List (NPL) for cleanup, as required by CERCLA. The EPA determined that the site did score high enough to be rated as an NPL site, but that its score did not rank high enough to require EPA Superfund Program cleanup oversight. Instead, EPA deferred oversight to the Division of Site Remediation (RI DEM).

Because the site is located on a national wildlife refuge, we voluntarily began the next phase of studies needed to determine the extent and characteristics of contamination. In 1995, we contracted a Site Investigation from Foster Wheeler Environmental Corporation, completed in April 1998. Its results indicated widespread distribution of several chemical compounds within the landfill area, including polynuclear aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), petroleum hydrocarbons, and metals. The contaminants detected and their concentration ranges are typical of those commonly found at municipal landfills known to have operated during the 1950's and 1960's. Lead is the contaminant that most consistently exceeds RI DEM criteria, especially in the surface soil.

We will close the site under RI DEM Site Remediation regulations. In February 1999, Foster Wheeler completed a Remedial Action Work Plan incorporating comments from RI DEM. A RI DEM-approved Remedial Action Design will be completed in Fall 2000. Remedial Alternatives Analysis indicates the preferred alternative is excavating and relocating waste, followed by capping the consolidated wastes contained on site. We hope to begin closing the site in Fall 2000 and to complete all work in 2001, assuming adequate funding is available. Depending on the final, approved Remedial Action Design, we estimate construction costs between \$2 million and \$4 million.

Contaminants – Trustom Pond Refuge

While conducting field surveys in a wooded portion of Trustom Pond Refuge, a University of Rhode Island biology class discovered an old farm dump that had gone undetected until 1982. The initial inspection found small piles of debris, discarded DDT canisters, and one container of pink liquid thought to be fuel. No analysis was conducted at that time. The site subsequently was listed on the Federal Facilities Compliance Docket as CERCLIS No. RID980915599.

Our Ecological Services Division began its Preliminary Assessment in the fall of 1995. They conducted a focused sampling and geophysical survey to determine if the old dump was a potential source of contamination, and an electromagnetic survey to search out buried wastes. One partly buried, rusted-out drum containing soil was found, removed, and its contents analyzed.

Their survey found trace-to-low concentrations of organochlorine pesticides sporadically present in surface soils in only one of the two small debris areas at the site. DDT slightly exceeded screening levels for ecological risk. None of the contaminants, including DDT, exceeded any screening levels for human health. The Preliminary Assessment concluded that the site did not pose a significant threat to human health or the environment (March 1996).

RI DEM requested some additional ground water analysis. Initial results on ground water sampling found slightly elevated lead levels in unfiltered samples. Subsequent analysis of filtered ground water samples found no elevated lead levels. RI DEM agreed at that point that the site did not warrant further cleanup.

On April 2, 1998, the site was archived (removed) from the EPA CERCLIS database. On April 21, 1998, EPA determined that a “No Further Federal Remedial Action Planned” decision was appropriate. EPA at that point considered RI DEM to be the lead agency overseeing hazardous waste compliance at the site. EPA did note in their April 21, 1998 decision that archived sites could be returned to the CERCLIS database if additional information or substantially altered site conditions warranted.

Contaminants – Ninigret Refuge

Department of Defense activities left four potential contaminant sites at the Refuge. EPA lists them collectively as CERCLIS No. RI9143530260. Three of the four sites (Eastern Area Landfill, Burnpit Area, and Ninigret Wildlife Refuge Landfill) are located entirely on the Refuge, while the On-site Landfill is located partly on Ninigret Park (Town of Charlestown). The U.S. Army Corps of Engineers (ACOE) has coordinated contaminant sampling and analysis at the sites since 1986. Various ACOE contractors have completed several different sampling and analysis studies. Each study has documented varying levels of contamination. The Burnpit Area, which served as a firefighter training site while the airfield was active appears to be the least contaminated.

The three landfills resulted from closure and demolition of the airfield prior to transfer of the property to the Service. Known contaminants include volatile organic compounds, semi-volatile organic compounds, pesticides, and metals. ACOE is continuing to assess the need to conduct additional sampling and environmental assessments, and is addressing EPA and RI DEM concerns, which may eventually lead to site remediation where necessary.

Research/Special Use Permits



Research. *Sampling for invertebrates on the beach helps to determine what piping plover are feeding on. This data will help the Refuge make sound management decisions regarding plover management. USFWS photo*

A detailed summary of Special Use Permits issued for research, commercial, and special events since 1988 is available upon request from the Refuge Complex office (Andres 1999). Researchers under permit are required to submit a completed report to the Refuge. Their reports are also available upon request. An impressive diversity of research is conducted on the Refuge, primarily through the University of Rhode Island. In 1998 and 1999, for example, studies evaluated changes in beach profile, biological control of deer ticks, the movement of white-tailed deer, songbird habitat, and the distribution of a moth suspected of being a biological control agent for an invasive plant species.

Part 2: Describing the Refuges

Block Island Refuge

Physical Resources

Topography, Soils and Hydrology

Glaciers deposited approximately 60 feet of New Shoreham drift, forming the island's hilly, morainal topography. Up to 3 feet of wind-deposited silt loess overlies glacial till deposits. Parts of Sandy Point were formed by finely sorted alluvial sands and wave and tidal shifting and deposition.



Block Island. *The North Light lighthouse, maintained by the town and surrounded by the Refuge, is the most popular destination point on northern Block Island. Access to the lighthouse is across approximately 500 feet of Refuge beach, via a right-of-way. USFWS photo*

Terrain on the northern parcel, around the North Light lighthouse, is rolling dunes and swales averaging 5- to 10-percent slopes; soils are primarily sand. Beane Point is a 21-acre upland with < 5-percent slopes composed of Paxton, very stony-fine sandy loams. The 13-acre Nevuus-Greenburg tract and O'Toole tract are primarily upland with < 10-percent slopes also composed of Paxton, very stony-fine sandy loams.

Block Island's groundwater supply depends entirely on rainfall, with kettle ponds and wetlands perched on compacted, clay soils. The Nevuus-Greenberg tract contains two very small ponds; otherwise, no freshwater lakes or ponds lie on Refuge property. Adjacent to Refuge lands, however, are

several small freshwater ponds, and the brackish Sachus Pond and saline Great Salt Pond. More than 365 ponds and emergent wetlands on the island provide a critical resource for many species.

Biological Resources

Block Island is unique from many perspectives, not least of which are its biological resources. In 1991, The Nature Conservancy selected Block Island as one of its 12 initial "Last Great Places" in the western hemisphere, primarily due to its ecological significance.

Our report, "Northeast Coastal Areas Study" (1991) noted the unique natural resources on Block Island:

"...one of the most important migratory bird habitats on the East Coast... [as it]...provides a critical link or stepping stone in the migration of many birds, particularly raptors and passerines, between southern New England and eastern Long Island, and points north and south."

The Nature Conservancy considers Block Island an internationally significant biodiversity reserve due to the presence of rare and endemic species and habitats, and because of the concentrations and diversity of songbirds, shorebirds, and raptors that migrate through the area. At least 15 rare, threatened, or endangered federal or state listed species, including birds, insects, mammals, and plants, reproduce on the island. Many additional rare birds pass through the island during migration.

Vegetation

Table 2-2 presents the dominant vegetation types and acreage for Block Island Refuge. Appendix C displays this graphically, based on Rhode Island Geographic Information System (RIGIS) land use-land cover data. Block Island Refuge is primarily upland, except for beach habitat at Cow Cove, Sandy Point, West Beach, and Beane Point.



Bayberry.

Beach habitat includes bare sand, beach grass (*Ammophila brevigulata*), poison ivy (*Rhus radicans*), bayberry (*Myrica pennsylvanica*), wild rose (*Rosa rugosa*), and beach plum (*Prunus maritima*). Upland shrub habitat includes northern arrowwood (*Viburnum recognitum*), pokeweed (*Phytolacca americana*), Virginia creeper (*Parthenocissus quinquefolia*), and bayberry. A list of plant species is available upon request from the Refuge office (George 1999).

Japanese black pine (*Pinus thunbergii*) has been planted extensively along eastern seashores since the 1940's because of its remarkable ability to withstand salt spray. But the future of the black pines on Block Island is uncertain. A mixture of bayberry and non-native Japanese black pine with a poison ivy understory dominates Beane Point. Those black pines provide important nesting habitat for a colony of wading birds, namely, black-crowned and yellow-crowned night-herons. Approximately 25 percent of the black pine on Beane Point has already been lost to an infestation of the black turpentine beetle (*Dendroctonus terebrans*). No attempts to treat the beetle have been made.

Native pitch pine (*Pinus rigida*) is also susceptible to black turpentine beetles and thus, is not a good replacement tree. Correspondence with Cornell University Cooperative Extension and Cape Cod Cooperative Extension suggest that chemical control of black turpentine beetle is not an option because of the proximity to water. At present, no native tree species resistant to the black turpentine beetle and tolerant of saline, shoreline environmental conditions is known.

Table 2-2. Land use/land cover at Block Island National Wildlife Refuge, Washington County, RI. (source: RI GIS)

Dominant cover-type	Acreage	Percentage
Agriculture	0.4	0.5%
Beaches	7.8	8.5
Brushland	20.8	22.8
Developed	5.6	6.1
Forest Upland	16.8	18.3
Sandy Areas (not beaches)	34.6	37.8
Water	2.2	2.4
Wetlands (not classified)	3.3	3.6
Total	91.5	100

Both the Nevuus-Greenberg and O'Toole tracts are characterized as shrub vegetation dominated by bayberry, arrowwood, winterberry, and chokecherry. The O'Toole property has a higher proportion of dry upland shrub.

Threatened and Endangered Species

Two federally listed species are known to breed on Block Island: the American burying beetle (endangered) and piping plover (threatened). We have a Recovery Plan for the American burying beetle (1991) and for the piping plover (Atlantic Coast Population, Revised Recovery Plan 1996).

Block Island harbors one of only a handful of American burying beetle populations, and the only population known east of the Mississippi River. The western populations occur in a limited distribution in western Arkansas, eastern Oklahoma, western Kansas, central Nebraska, and southern South Dakota. Unfortunately, the American burying beetle remains absent from more than 90% of its historic range (Amaral 2000). Surveys in recent years found the majority of the Block Island burying beetle breeding population in the grassland habitat on the southern end of the island, and have twice documented beetles on or adjacent to Refuge land, including near Beane Point and just north of Great Salt Pond. In 1998, the town owned fields just south of Sachem Pond were surveyed and American burying beetle were captured in low numbers. The beetles are highly mobile on the island, and in fact, could be found foraging in any of its fields today (Amaral 1999).

Beetles on the Refuge are likely foraging primarily on dead pheasant chicks, and occasionally on dead gull and black-crowned night-heron chicks. Annual surveys and monitoring of the breeding population have concentrated on the southern portion of the island. Its northern portion, including the Refuge, have not been surveyed as intensively.

In 1991, biologists placed the carcass of a herring gull chick on the Beane Point portion of the Refuge, and later found an adult female burying beetle preparing the carcass (Amaral 1999). No other burying beetle observations on the Refuge have been recorded. In general, the lack of suitable prey items, poor soils for burying prey items, and lack of grasslands underlie the inferior suitability of the north end (Kozol, et al. 1986). However, our New England Field Office recommends further evaluating areas of suitable soil on the north end before dismissing it as poor habitat (Amaral 1999).

Piping plovers attempting to nest near Sandy Point in 1996 laid eggs that never hatched. Field examination revealed the eggs had hardened, as if the birds had been off the nest for an extended period. In 1997, a pair of piping plover initiated nesting behavior, but never laid eggs. Piping plover briefly seen in the area in 1998 did not attempt nesting. None were seen in 1999. In 2000, a pair fledged two young on a town beach south of Beane Point. These have been the only documented nesting attempts in the last 15 years. No one has yet determined why plovers are unsuccessful here, although human disturbance and gull predation are possible contributing factors. The remoteness of potential source populations may also hinder reestablishment of breeding plovers in this nesting area.

Most of the suitable beach habitat for plover lies between Settlers Rock and the Sandy Point Tip. Other than a small stretch of Refuge beach, most is owned by the Town of New Shoreham. Under a cooperative management strategy with the Town, the beach between the North Light and Sandy Point will be fenced, using symbolic fencing, to public use if piping plover are seen exhibiting territorial behavior. We are alerted to this behavior by staff of The Nature Conservancy-Block Island who monitor this beach at least weekly during the breeding season. We will erect nest exclosures around any areas suspected to be the actual nest site.



Symbolic fencing. USFWS photo

Symbolic fencing consists of intervisible, 5'- to 6' high metal posts spaced approximately 100' apart. Each post holds a sign that reads "Bird Nesting Area." No physical barriers connect the posts. Nest exclosures are welded 2"x4" wire-mesh cages 10' in diameter that are placed over nests (typically just a scrape in the sand). Exclosures are topped with 1" black plastic mesh, and some sections have yellow nylon rope connecting their posts. The wire mesh allows plover to enter and exit, but excludes most predators.

A group of two to four immature bald eagles has been observed near ponds through the past five summers, feeding on waterfowl and fish; one roost site near Middle Pond's west shore has been documented. More monitoring is needed to document habitat use by these birds.



Predator exclosures. USFWS photo

The 1994 Recovery Plan for the northeastern beach tiger beetle (threatened) identifies Block Island as a low potential reintroduction site (USFWS 1993). This species has not been documented in Rhode Island since the 1950's, but was known historically on Block Island's Crescent Beach. The nearest population of northeastern beach tiger beetles is near Westport, MA. According to Susanna vonOettingen of our New England Field Office, there are no plans to reintroduce the northeastern beach tiger beetle outside of Massachusetts for approximately 10 years. A source population to begin reintroduction has not been established. Also, the highest priority reintroduction site in Rhode Island would likely be the Weekapaug, Misquamicut, and Napatree Point areas, where the beaches generally are wider (vonOettingen 1998).

Some State-listed species also occur on the Refuge. Thirty-seven black-crowned night-heron (*Nycticorax nycticorax*) (endangered RI) nests were documented in a colony on Beane Point in 1998, an increase from the 29 nests counted in 1996 and 1997. This population has been documented on Block Island since 1976; however, they did not move to the Beane Point location until 1985. Prior to this, the rookery was located on the south side of West Beach road and briefly on the south shore of Sachem Pond. In both of these settings, the rookery was in shrub habitat (Ferren and Myer 1998, Raithel pers com 2000). Nesting with the black-crowned night-herons are one pair of great egrets (*Casmerodius albus*) and one pair of snowy egrets (*Egretta thula*) (endangered RI). A few yellow-crowned night-herons (*Nycticorax violacea*) (endangered RI) nest nearby. This is the only heron colony known on the island. As stated earlier, these birds are nesting in a dying stand of Japanese black pine. Adjacent landowners have informed us that, before nesting in the black pine, the black-crowned night-herons used to nest in shadbush on the island. This has implications for evaluating how to replace the nesting structure provided by the black pine.

Three to five American oystercatchers (*Haematopus palliatus*) (endangered RI) also nest on Beane Point and occasionally have been found near Sandy Point. Sea beach knotweed (*Polygonum glaucum*) (endangered RI) is sometimes found near Sandy Point.

Block Island is the only place in Rhode Island where northern harriers (*Circus cyaneus*) (endangered RI) nest. A total of 15 nests occur on the island; up to six nests occur near Refuge lands, but none have been documented on the Refuge. Block Island is also one of only two places in the world where barn owls (*Tyto alba*) (endangered RI) nest in sea cliff cavities rather than in human-made structures or inland cliff crevices; however, none of the four known cliff sites are on Refuge lands. No other nests are known for barn owls in Rhode Island.

Reptiles and Amphibians



Green frog.

Green frog (*Rana clamitans*), peepers (*Pseudacris crucifer*), and red-spotted newts (*Notophthalmus v. viridescens*) occur in the island's scattered freshwater ponds. Reptiles include common snapping turtle (*Chelydra s. serpentina*), spotted turtle (*Clemmys guttata*), eastern painted turtle (*Chrysemys p. picta*), northern water snake (*Nerodia sipedon*), eastern garter snake (*Thamnophis s. sirtalis*), northern brown snake (*Storeria d. dekayi*), and an occasional diamondback terrapin (*Malaclemys terrapin*). No surveys have been conducted on the Refuge. There is speculation that some of these may be distinct subspecies, since they have been separated from mainland populations for at least 8,000 years.

Birds

Appendix D lists birds known to occur on each refuge. With the exception of the gull colony and heron rookery, very little survey data exists on bird species and their abundance specific to Block Island Refuge.

The Refuge gull colony, the largest in the State, has been surveyed since 1981 (Comings 2000). Refuge staff, The Nature Conservancy on Block Island, and RI DEM have been monitoring the colony because of a concern the gulls could impact other native species through increased predation or physical displacement as they dominate nesting sites. Gulls are known to prey on piping plover chicks, and thus pose a threat to management for that species.

Figure 2-2 shows that overall gull populations have been gradually decreasing. Closing the landfill on West Beach and switching to a transfer station in 1990 probably contributed to this decline. Although it is important to note that gull populations are down statewide, great black-backed gulls are systematically displacing herring gulls (Raithel 1999). In recent years, the black-backed gulls have forced herring gulls into the less hospitable shrub habitat for nesting. Unfortunately, black-backed gulls pose a greater threat to other native birds because they are a more aggressive predator than herring gulls.

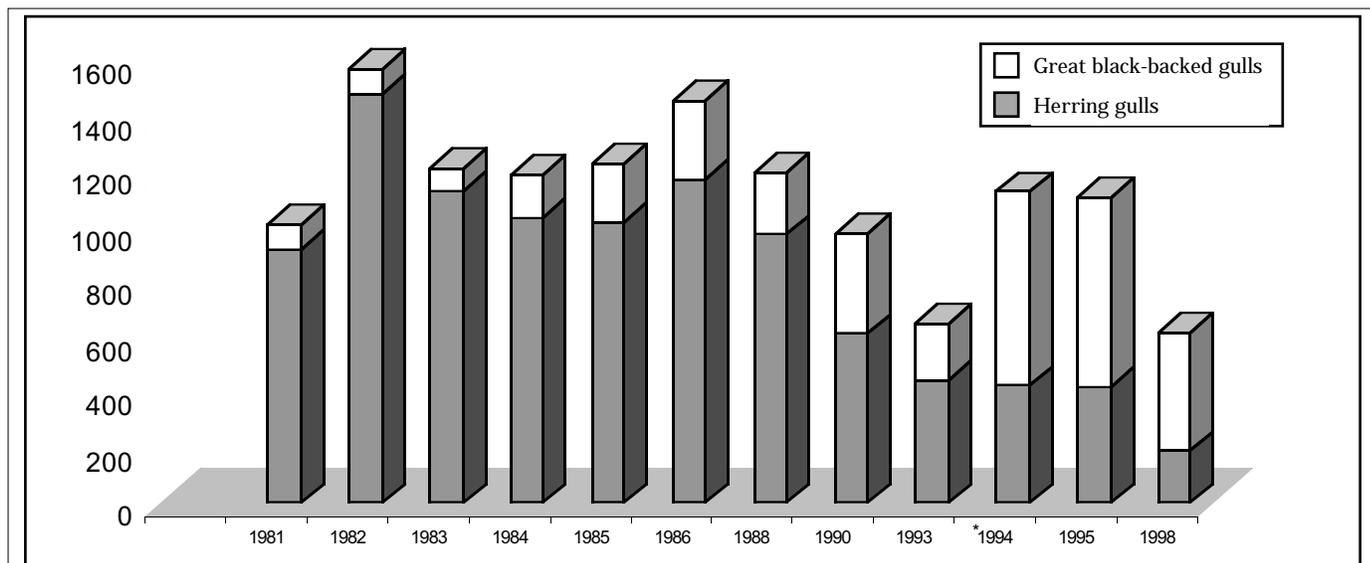


Figure 2-2. Number of active gull nests at Block Island Refuge for select years between 1981 - 1998. (Data for 1993 represents only a partial count of the colony. No surveys were done for intervening years.)

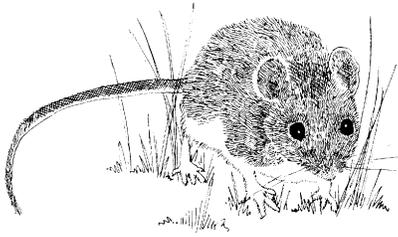
While no formal surveys have been conducted for songbirds on Refuge lands, The Nature Conservancy has two permanent banding stations on Clayhead Preserve on the northern end of the island. More than 6,000 birds representing 95 species are banded in a given year. This banding provides valuable information on the diversity of species breeding and migrating on the northern tip of the island. The habitat consists of shrub-scrub pine and kettle ponds.

Block Island is internationally famous among birders for its spectacular fall songbird migration. Data reveals that the island provides crucial habitat for both spring and fall migratory shorebirds and songbirds. Its northern tip, in particular, consistently supports large concentrations of fall migrants. Thousands of Neotropical migrants, representing 70 species, have been documented. Of interest is the fact that the vast majority of these fall migrants are juveniles. Studies indicate that juvenile birds are severely dehydrated by the time they reach Block Island, and that its ~ 365 small ponds and abundance of fruit-bearing shrubs provide life-saving rehydration. Many typically omnivorous migrants forage exclusively on berries while on Block Island (Parrish 1999). Northern arrowwood, northern bayberry, and pokeweed were the predominate fruit-bearing shrubs used by birds. Shrub habitat also provides resting shelter for migrating birds.

In his 3-year study of frugivory in landbirds on Block Island, Parrish noted that fruit-bearing shrubs important to migratory birds are superabundant on Block Island, evidenced by: (1) the fact birds never removed entire fruit crops; (2) interspecific and intraspecific aggression were uncommon; and (3) estimates of fruit removal ranged from 25 percent to 40 percent at individual sites.

Shorebirds pass through in large numbers during midsummer and early fall. Typically, 40 different shorebird species have been observed using the mudflats and saltmarshes and wrack lines on open beach, including piping plover and whimbrel (Comings 2000).

Mammals



White-footed mouse.

Block Island is unique regarding mammals, because no native, terrestrial mammalian predators reportedly occur on the island. Feral cats and Norway rats are the biggest threat to small mammals, bird eggs, and chicks. No predator control measures have been implemented on the Refuge.

Seals occasionally haul out on the Refuge shoreline near Sandy Point; however, no formal surveys have been conducted. The Block Island meadow vole (*Microtus pennsylvanicus provectus*) is considered endemic to Block Island. Other small mammals include the white-footed mouse (*Peromyscus leucopus*), introduced muskrat (*Ondatra zibethicus*), house mouse (*Mus musculus*), and Norway rat (*Rattus norvegicus*). Since no surveys of bats have been conducted, we do not know what species, if any, use the Refuge.

The overabundant population of white-tailed deer has been an important issue in recent years because deer are not native to the island, and there are no natural predators to control the population. The Town of New Shoreham and RI DEM administer a hunt program to substantially reduce the deer herd on portions of the island. Huntability is limited on the Island, due to limited access on private and public lands. Deer numbers on the Refuge are not known, and hunting is not permitted.

Cultural Resources

When English settlers first encountered Native Americans on Block Island in 1661, they described two large, permanent villages of 60 wigwams each and 100 acres of agricultural fields. Within the year, the settlers had surveyed and divided the island into lots. There are accounts of the settlers' enslavement of Native Americans to expedite clearing and construction. Native Americans disappeared from the census in 1875 (USFWS 1999).

No prehistoric sites have been recorded on Block Island Refuge, and we have not conducted any formal archaeological surveys. We consider the entire Refuge highly sensitive for archeological deposits. The North Light lighthouse, formerly on the Refuge but now on town property, is listed on the National Register of Historic Places. Archeologists have examined a 19th-20th century fishing village site on Refuge property that has been impacted by coastal erosion and dune migration.

Public Use

We do not maintain a Service presence on Block Island, although Refuge staff recognize the need for at least one seasonal employee to be stationed on the island during peak summer season. The opportunities for public contact are extensive, and include environmental education and interpretation.

Based on informal visitor counts (The Nature Conservancy 1998), we estimate annual public use on Block Island Refuge between Settlers Rock and Sandy Point Beaches at 200,000 total visitor days. No formal counts have been done. The Refuge Complex has not established a systematic strategy for collecting and documenting visitor use.

Principal wildlife-dependent public use on Refuge lands includes surf fishing, wildlife observation, environmental education, and photography. We opened the Refuge to surf fishing under State regulations through a Federal Register Notice in 1998 (50 CFR 32). That notice did not specify any geographic limits for surf fishing, and thus, the Beane Point tract was inadvertently included. With the exception of surf fishing, the Beane Point, O'Toole, and Nevuus-Greenberg tracts are not officially open to any other public use.

In 1994, Refuge staff completed a compatibility determination for wildlife observation and interpretation, formally establishing these activities as compatible uses on the northern tract, near Sandy Point. That determination also found dog-walking a non-compatible use. No other compatibility determinations have been completed. Because of the lack of Service presence on the island, very little public use enforcement occurs.

Current non-wildlife-dependent uses on the northern portion of the island include swimming, sunbathing, driving off-road vehicles (ORV) picnicking, jogging, and dog walking. On Beane Point, it is fairly common for boaters to land on the Point and walk, often with dogs, along the shoreline.

No public-use infrastructure is maintained by Refuge staff. A short section of an unofficial, 5-mile hiking trail in the West Beach area crosses Refuge lands. The North Light lighthouse, maintained by the town but surrounded by the Refuge, is the most popular visitor destination on northern Block Island. Access to the lighthouse crosses approximately 500 feet of Refuge beach via a right-of-way. Vehicles use this right-of-way to access both the lighthouse and surf fishing sites.

Cooperative management of public use on the northern portion of Block Island strives to protect nesting piping plover. The Town of New Shoreham closed Sandy Point Beach from the lighthouse to the Point in 1996 and 1997, in conjunction with closures on the Refuge beach after nesting piping plover had been observed. In 1998 and 1999, no nesting behavior was observed, and neither the town property nor the Refuge beach was closed.

Ninigret Refuge

Physical Resources

Geology and Hydrology

Most of Ninigret Refuge has a very high water table (6'-10' below the surface). Military excavations created several ponds as a result. Most of these man-made ponds are small and fairly unproductive, with steep sides and gravel bottoms. No natural streams exist on the Refuge. The Navy constructed a series of ditches designed to direct runoff from the runways into Ninigret Pond. These ditches are responsible for reducing the salinity in at least two salt marshes, allowing an invasive plant species (*Phragmites* spp.) to take over these wetlands.



Former Runways. Remnants of the former Charlestown Naval Auxiliary Land Facility (pictured here in this 1977 aerial photo; before restoration) continue to dominate the landscape at Ninigret Refuge. Even after restoration, vestiges of three asphalt runways and two taxiways, encompassing at least 70 acres, leave distinctive linear patterns on the landscape. USFWS photo.

Some evidence suggests that the creation of runways and the resulting compaction of the underlying silt created a barrier impervious to water, causing runoff. After the recent removal of asphalt runway, some ponds are still forming, indicating this compacted silt layer still exists, and might need to be broken through to prevent frost-heaving of newly planted native grasses.

Topography and Soils

Most of the 409-acre Refuge is located on a coastal outwash plain emanating from the base of the Charlestown Moraine. The Refuge area is typical of coastal sandplain characterized by relatively flat terrain and sandy soils derived from sorted silt, sand, and gravel that flowed out from glacial meltwaters. Most soils on the Refuge are fine sand and silt loams in the Bridgehampton series and have very low levels of nutrients and organic matter. A high gravel content also characterizes Refuge subsoil.

Biological Resources

Wetlands

Approximately 16 percent of Ninigret Refuge is wetland, including salt marsh, small, man-made ponds, forested and scrub-shrub wetlands, and emergent wetlands with varying amounts of open water. Most natural freshwater wetlands on the Refuge are glacial kettle holes. The Refuge contains at least 13 permanent ponds. Some tidal ponds on its mainland portion have restricted tidal flow due to siltation, and have become increasingly fresh. Most of the salt marsh acreage exists on the barrier beach parcel.

Unfortunately, most of the wetlands have diminished wildlife value because of the presence of Phragmites. Phragmites indicate a disturbed wetland, especially where the natural flushing of salt water has been altered, salinity has declined, or where sediment loading has occurred. The monotypic, virtually impenetrable stands of Phragmites choke out native plants, and provide little suitable food or cover for wildlife. Besides Phragmites, other dominant plants in the emergent freshwater wetlands are broad-leaved cattail (*Typha latifolia*), and a variety of sedges and rushes (*Juncus spp.*, *Eleocharis spp.*, *Scirpus spp.*). A portion of a red maple swamp lies on the western edge of the Refuge. Several scrub-shrub wetlands are scattered throughout the area, dominated by buttonbush (*Cephalanthus occidentalis*), swamp rose (*Rosa palustris*), and swamp loosestrife (*Decodon verticillatus*).

Buried wetlands

Upon removal of the first segments of asphalt runway, evidence of several small wetlands, former vernal pools, were found buried under their gravel base. Aerial photographs in 1939 identified a total of five original wetland sites, which predate runway construction. At least two sites were located in 1997 by the presence of hydric soils and the remains of wetland seeds and plants. One of these wetlands had remnants of pinnate-leaved water milfoil (*Myriophyllum pinnatum*), a species that has not been reported in Rhode Island since 1913. Both sites have hydric soils about 40 inches below the surface and have scattered bulrush seeds and stems and other native wetland plant parts. Based on the 1939 aerial photographs, there appears to be at least one more site that remains buried underneath the runways.

The Refuge biologist completed a management plan to restore the wetlands (1998) that includes mechanically removing layers of silt until the hydric soils are reached. The area to be disturbed is shaped roughly like a large footprint approximately 370 feet long and 110 feet at its widest point. Removed soils would be stockpiled on two adjacent sites and graded to create sloping mounds. The wetland edges would be seeded with native grasses. This project has not been funded.

Land use and dominant land cover types

(see **Table 2-3**)

Ninigret Pond: The open water of Ninigret Pond is not technically part of the Refuge; however, the Refuge does include approximately 3 miles of its shoreline, and another mile of shoreline along Foster's Cove. The presence of Ninigret Pond is a significant attraction to wildlife and Refuge visitors and thus, has a direct influence on use and management of Refuge land. For example, most Refuge trails for viewing wildlife and scenery access the pond.

Table 2-3. *Land use/dominant land cover types on Ninigret Refuge.*

<i>Cover type</i>	<i>Acreage</i>	<i>Percent</i>
Developed	64.5	15.5%
Native emergent wetland	9.8	2.4
Native forest upland	126.9	30.5
Native forest wetland	4.6	1.1
Native grass	40.6	9.8
Native shrub upland	88.4	21.3
Native shrub wetland	10.6	2.6
Non-native emergent wetland	32.2	7.7
Non-native shrub upland	16.3	3.9
Sand	9.6	2.3
Vegetated sand dunes	4.6	1.1
Water	7.6	1.8
Total	415.7	100%

Ninigret Pond is the largest of the South Shore salt ponds, with an area of 1,711 acres and an average depth of 4 feet. It also has the largest associated watershed, 6,025 acres. The construction of a permanent breachway in 1962 to stabilize the pond radically changed its ecology, as evidenced by a depletion of the formerly productive estuarine fisheries. Habitat degradation includes the loss of 40 percent of its eelgrass beds over the last 32 years due to sedimentation and nutrient loading (RI CRMC 1998).

Water quality in Ninigret Pond is poor, as evidenced by elevated levels of nitrogen and fecal coliform bacteria (RI CRMC 1998). Symptoms of eutrophication from excessive nutrient loading include surface algal scum and discolored water. In 1996, the eastern portion of Ninigret Pond (where it connects to Green Hill Pond) was permanently closed to shell fishing due to the health risks associated with elevated fecal coliform bacteria.

Vegetation

Table 2-3 displays the dominant land cover types for Ninigret Refuge. Appendix C presents this graphically, based on 1995 aerial photo interpretation completed by the Refuge. A mosaic of diverse vegetation types covers the Refuge, composed of approximately 84 percent upland and 16 percent wetland. More than 400 species of plants have been identified on the Refuge, and recent plant surveys have rediscovered several species of plants which had not been recorded in Rhode Island for many years. A plant species list for Ninigret Refuge is available upon request from the Refuge office (George 1999).

Grasslands

The Rhode Island Natural Heritage Program identifies coastal sandplain grasslands as a globally rare community (G2 & G3) under its ranking system. Only remnant patches of these native grasslands exist on Ninigret Refuge, and much of what remains is overgrown by shrubs and trees or dominated by forbs. The suitability of the Refuge to many grassland-dependent species has declined or has been eliminated as a result of the succession to shrubs and trees. Approximately 10 percent of the Refuge currently consists of herbaceous vegetation dominated by switchgrass (*Panicum virgatum*) and rough-leaved goldenrod (*Solidago rugosa*).

In July 1997, an environmental assessment was approved for habitat restoration at the Refuge. Its stated goals are to restore native coastal sandplain grassland habitat and associated wildlife, especially those declining regionally, and to sustain the biological communities. The project would restore 60 acres of asphalt runway and 10 acres of stabilized gravel to native grasslands, and create an ADA-accessible trail system.

An additional 150 acres of grassland are currently maintained or will be created from shrubland through mowing and hydroaxing. Mowing and hydroaxing serve to keep woody vegetation from getting established in existing grasslands, or to set back succession in shrublands in an attempt to simulate the structure of grasslands.

We began the runway restoration project in 1997. Eighteen acres of runway were removed in a cooperative venture with the Army Reserve Unit during 1997 and 1998; Refuge staff removed an additional 9 acres, and Navy Seabee Reserves removed an additional 15 acres in 1999. The original plan was to complete the asphalt removal in 2000.

To prepare for planting, rocks were windrowed and dumped into an excavated hole, or piled to the side. Approximately 5 acres were prepared in 1998 using a York rake on a farm tractor. The 5 acres were then fertilized and seeded with native grasses (predominantly little bluestem and switchgrass). So far, the restoration has been successful. Pennsylvanian sedge (*Carex pensylvanica*), sheep fescue (*Festuca filiformis*), switchgrass, blue-eyed grass (*Sisyrinchium atlanticum*), slender blue flag (*Iris prismatica*), and numerous goldenrods have established themselves in the restored sites. An additional 18 acres of native grasslands were planted in 1999. The area will be maintained through mechanical and chemical treatments.

Encroaching woody vegetation is continually a problem in the restored areas. Fifteen acres of red cedar and shrubs adjacent to the runways were hydroaxed in 1998. Another small field was prescription-burned in May 1998 to determine if this was a viable method for controlling woody vegetation in grasslands. Garlon 3A, an herbicide, was also tested on woody vegetation. The burned and herbicide areas are still being monitored to determine effectiveness. The Coastal Sandplain Grassland Restoration EA and the Ninigret Refuge Upland Management Plan (draft) describe additional strategies for restoring grassland habitat. A 1998 Progress Report on the restoration project makes several recommendations for maintaining restored areas (Flores 1998).

Restoring the grasslands may offer the opportunity to reintroduce plant species of concern, such as sandplain gerardia (federal-listed endangered), bushy rockrose (former federal candidate and endangered RI), and New England blazing star (former federal candidate and endangered RI).

A unique rare plant site, containing six species the State considers rare or endangered, lies within the grassland habitat on Ninigret Refuge. The rare species include colicroot (*Aletris farinosa*), slimspike three-awn (*Aristida longespica*), yellow-fringed orchids (*Platanthera ciliaris*), tall- and few-flowered nutrushes (*Scleria triglomerata*, *S. paucifolia*), and Indiangrass (*Sorghastrum nutans*). This unique assemblage resulted in a study recently published in *Northeastern Naturalist* (Killingbeck, et al. 1998). Extensive vegetation analysis and evaluation of site characteristics were done in 1996. Permanent vegetation monitoring transects were established as well (Killingbeck and Deegan 1996). Woody vegetation covered an average 56 percent of the quadrants sampled. Evidence from soil data indicates the site was previously disturbed because the topsoil and organic matter were non-existent in the core area. The site evaluation indicated a significant increase in the percent cover of Drosera, lichens, moss, and unvegetated soil within the core area, as opposed to adjacent sites without rare plants.

Shrublands

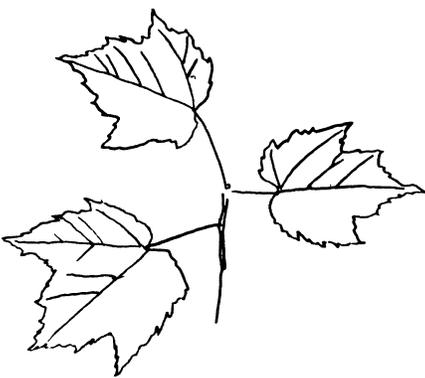
Approximately 25 percent of the Refuge is upland shrub habitat. Shrubland communities vary in height and composition but are usually dominated by northern arrowwood (*Viburnum dentatum*), sumacs (*Rhus spp.*), bayberry (*Myrica pensylvanica*), highbush blueberry (*Vaccinium corymbosum*), or shadbush (*Amelanchier canadensis*). Most shrubs average 9' to 12' tall. Non-native plants such as Asian bittersweet dominate about 15 acres and have affected upland areas by crowding out native trees and shrubs.

Forests

The forest cover type has increased the most in the past 15 years, and now totals 132 acres, or 32 percent of the Refuge. Red maple and black cherry (*Prunus serotina*) dominate upland forest cover, followed by eastern red cedar (*Juniperus virginiana*), quaking aspen (*Populus tremuloides*), and gray birch (*Betula populifolia*). Red maple dominates the forested wetlands. Some remnant pitch pine (*Pinus rigida*) is also found on the Refuge. The oldest forest stands occur on the western edge of Ninigret Refuge and within an isolated peninsula near the shrub wetland in the center of the Refuge.

Invasive Plants

Intensive surveys have shown invasive plants to be wide-spread on Ninigret Refuge at varying densities. Most of these are strong pioneer species that establish quickly and reproduce prolifically. Since they are so prolific, they will out-compete native vegetation and create a monoculture. While some of these species provide cover and food for wildlife, their dominance of the landscape will ultimately decrease biodiversity on the Refuge.



Red maple

Asian bittersweet and Phragmites are two of the most common invasive plants on the refuge, and dominate cover on 15 and 32 acres, respectively. The Refuge is currently working with the University of Rhode Island on an experimental release of a European moth to control Phragmites. Autumn olive is also fairly common on the Refuge, and was actually planted during the 1980's along the runways as wildlife food. This species occupies about 4 acres and continues its aggressive spread. Autumn olive will have to be controlled if the grasslands restoration project is to succeed.

Several species of honeysuckle are also found throughout Refuge lands, comprising about 14 acres total. Honeysuckles exist at lower densities than the other invasive species, and are found in more shaded areas.

Threatened and Endangered Species

All threatened and endangered species and other species of concern for the Refuge Complex are listed in Appendix A, Trust Species and Other Species and Habitats of Management Concern.



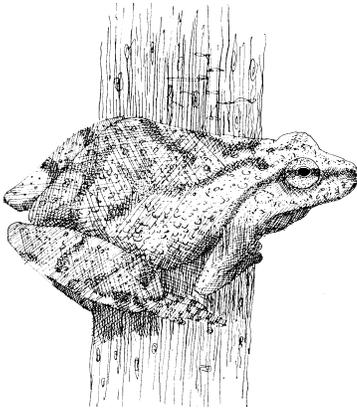
Bald eagle.

Federal-listed: The bald eagle can be found at Ninigret Refuge during fall migration. Piping plover, a threatened species, have nested either on the barrier beach portion of the Refuge or on the adjacent Ninigret Conservation Area every year since 1993. Piping plover typically breed on beaches from April through July, and into August if they re-nest after losing an early clutch. Symbolic fencing and nest enclosures are put in place each April. Fencing is taken down once chicks fledge.

State-listed: Appendix A also lists the status of State species of concern. Two State-listed grassland-dependent bird species, the grasshopper sparrow and the upland sandpiper, are focus species for grasslands management on Ninigret Refuge. The Refuge was historical nesting habitat for both species (Enser 1999; Schneider and Pence 1992). Both species require large expanses of grassland for breeding and foraging. One study indicates grasshopper sparrows require 30 acres minimum breeding habitat (preferably 100 acres or greater) (Vickery, et al. 1994). Records for upland sandpiper suggest 150 acres are required (Schneider and Pence 1994). These species have different tolerances for interspersed patches of shrubland, the grasshopper sparrow being more tolerant. Their presence would validate the success of grasslands restoration.

Invertebrates

Surveys for deer ticks are the only invertebrate studies conducted on the Refuge. Deer tick surveys indicate that Ninigret Refuge is a hotspot for ticks carrying Lyme disease, erlichiosis, and babesiosis. The Refuge intends to coordinate with TNC's 5-year atlas project begun in 1998 to document dragonflies and damselflies throughout the State.

Amphibians and Reptiles

Spring peeper.

A report entitled “Amphibian Community Structure at the Rhode Island National Wildlife Refuge Complex” (Paton, et al. February 1999) focused primarily on Trustom Pond Refuge, but offers information on amphibians using Ninigret Refuge as well. The red maple swamp and the small pools scattered throughout the Refuge likely provide the best habitats for amphibians. Amphibians generally do not occur within tidal waters because salt water dries their skin. Gray tree frogs (*Hyla versicolor*), spring peepers (*Pseudacris crucifer*) and green frogs (*Rana clamitans*) are the most abundant frog species. Red-backed salamanders (*Plethodon cinereus*) were the only members of that group found on the Refuge, but other salamander species probably occur in the area. The report states that the amphibian communities at both Trustom Pond Refuge and Ninigret Refuge are relatively rich and thriving, and states the Refuges are vital and critical to the conservation of amphibians in Rhode Island.

Snapping, painted, and spotted turtles (*C. guttata*) are abundant in most of the ponds on the Refuge. They are also known to occur in brackish water and may venture out into estuaries. Recently, eastern box turtles (*Terrepenne carolina*) have been found in the uplands. Six species of snakes have also been observed on the Refuge: eastern garter snake, ribbon snake (*T. sauritus*), northern water snake (*Natrix sipedon*), black racer (*Coluber constrictor*), eastern milk snake (*Lampropeltis triangulum*), and northern brown snake (*Storeria dekayi*).

Birds

The wide variety of habitats have contributed to the great diversity of birds found on Ninigret Refuge. Appendix D lists birds found on the Refuge Complex by season. Approximately 70 species are known to nest on the Refuge. Recent mist-netting on Refuge lands has shown that gray catbirds (*Dumetella carolinensis*), common yellowthroats (*Geothlypis trichas*), and red-winged blackbirds (*Agelaius phoeniceus*) are the most abundant nesting birds in the shrub community (Eddleman 1993, 1994; Wallace 1995; Paton 1996, 1997, 1998). Breeding Bird Survey data indicates that the Refuge may have one of the highest densities of nesting yellow-breasted chat in Rhode Island (Enser 1998). Other birds using early successional shrub and grassland vegetation for nesting include white-eyed vireo, black-billed cuckoo, willow flycatcher, northern bobwhite, prairie warbler, and American woodcock. Recently, bobolink, eastern meadowlark, eastern bluebirds, and wild turkey have been found nesting on the Refuge.

Birds using the wetlands include green herons, wood ducks, Virginia rails, swamp sparrows, and marsh wrens. The coastal location of the Refuge Complex provides vital stopover habitat for migratory birds seeking to quickly and safely accumulate energy stores. According to Moore, coastal scrub/shrub and dune/scrub habitats provide very high species richness and abundance (Moore, et al. 1995). Birds are primarily foraging on berries and insects. As residential development along the coast continues, maintaining and enhancing these habitats will become even more important.

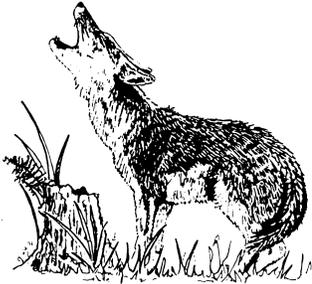
Table 2-4. Peak waterfowl numbers on Ninigret Pond from 1992 to 1999.

	1992	1993	1994	1995	1996	1997	1998	1999
Mute swan	32	34	7	22	12	20	26	29
Snow goose	-	5	-	-	1	1	-	0
Brant	12	1	-	9	-	15	-	5
Canada goose	72	61	14	12	150	95	133	145
Wood duck	-	2	-	5	2	-	-	0
Green-winged teal	4	2	2	3	-	-	-	-
Blue winged teal	3	5	-	-	-	-	-	-
American black duck	102	497	346	224	155	237	188	168
Mallard	5	10	4	8	40	8	34	36
Gadwall	1	22	-	5	-	8	-	-
American wigeon	-	2	-	-	2	-	-	-
Canvasback		1	20	5	27	-	-	-
Redhead	-	2	2	-	-	-	-	-
Ring-necked duck	-	520	-	-	-	-	-	-
Greater scaup	37		346	200	400	350	534	172
Lesser scaup	-	-	1	-	15	225	306	4
Common eider	-	-	-	-	1	1	-	-
King eider	-	-	-	-	-	-	1	-
Oldsquaw	1	-	-	-	3	3	1	1
Black scoter	-	-	-	-	3	-	-	-
Surf scoter	1	-	1	5	3	-	-	1
White-winged scoter	8	24	-	3	-	-	-	-
Common goldeneye	2	750	401	252	310	159	81	225
Bufflehead	401	699	1725	700	949	924	864	815
Hooded merganser	2	2	1	4	9	26	34	16
Red breasted merganser		250	211	365	415	370	325	413
Ruddy duck	-	-	2	15	-	-	-	12
Northern pintail	-	-	-	-	-	-	-	1
Common merganser	-	22	290	-	14	9	15	11

Winter birds present on the Refuge include northern harrier, short-eared owl, eastern bluebird, and a variety of sparrows. Waterfowl include black duck, mallard, American wigeon, and green-winged teal. Ninigret Pond is an important wintering area for bufflehead, common goldeneye, greater scaup, and red-breasted merganser. Recent surveys for wintering greater scaup reveal that many of the waterfowl that feed in Ninigret Pond will rest at Trustom Pond during the day (Cohen 1998). **Table 2-4** summarizes waterfowl numbers at Ninigret Pond from 1992 to 1999.

Mammals

Twenty-two species of mammals have been observed on the Refuge. Large mammals include white-tailed deer (*Odocoileus virginianus*), coyote (*Canus latrans*), red squirrel (*Tamiasciurus hudsonicus*), red fox (*Vulpes fulva*), raccoon (*Procyon lotor*), striped skunk (*Mephites mephites*), and eastern cottontail (*Sylvilagus floridanus*). Mink (*Mustella vison*) and river otter (*Lutra canadensis*) have been observed on or adjacent to the Refuge. Small mammals include eastern meadow vole (*Microtus pennsylvanicus*), white-footed mouse (*Peromyscus leucopus*) and woodland jumping mice (*Napaeozapus insignis*).



Coyote.

We suspect from the evidence of high browse line along trails and habitat edges that the white-tailed deer population is near or above carrying capacity at Ninigret Refuge. Deer are a potential threat to managing the rare native plant site. Although we have not begun studies to substantiate this concern, the sheer numbers and distribution of deer make it an eventuality. Permanent monitoring points at the rare plant site will allow further investigation of this issue.

Fish

Since Ninigret Pond is not technically part of the Refuge, Refuge staff do not manage the fisheries resource. According to the Coastal Salt Pond Special Area Management Plan, more than 100 species of finfish and shellfish utilize coastal salt ponds at some stage of their life cycle. The fisheries in Ninigret Pond are diverse, although quantitative information is scarce. It is widely perceived today that stocks of the most popular species such as quahogs, scallops, oysters, and flounder are all declining (RI CRMC 1998).

Cultural Resources

Past military activities have also affected archeological resources at Ninigret Refuge. Only a few areas have intact soils. Construction of the Charlestown Naval Auxiliary Landing Facility required massive earth moving, which would have impacted the integrity of many archeological sites. One is listed on the National Register of Historic Places for its historic use as a shellfish gathering site by the Narragansett Indians. Another, a burial site for the Narragansett Indians, was discovered during the runway construction and was recorded with the Rhode Island Historic Preservation and Heritage Commission (RI HPHC). The intact areas are considered highly sensitive for archeological resources. Studies of these sites have been limited in area and scope. No comprehensive archeological surveys have been done on the Refuge.

The RI HPHC (1974) conducted a historical, architectural, and archeological investigation of the former Charlestown Naval Auxiliary Landing Facility, after a proposal to construct a nuclear power plant had been submitted to the State. Its findings conclude that "...the existing buildings at the former Naval Air Station have little historic or architectural importance."

Public Use

Each year, Refuge staff estimate public use for Ninigret Refuge. However, no consistent method for collecting and documenting that data exists. Much incidental use occurs through spillover from activities and events at adjacent Ninigret Park. We estimate the number of visitors to Ninigret Refuge in 1998 at 35,000.

We expect future visits to increase dramatically once the barrier-free trail system has been completed. Known public use activities vary seasonally, and include wildlife-dependent activities such as birding, nature observation and photography, environmental education and interpretation, recreational fishing, and access for recreational and commercial shell fishing in Ninigret Pond.

No hunting occurs on Refuge lands. We officially opened the barrier beach of Ninigret Refuge to surf fishing in a Federal Register Notice in 1998 (50 CFR 32). The same notice allowed saltwater fishing and shell fishing from Refuge lands at Ninigret Pond between sunrise and sunset, in accordance with State regulations.

In 1994, environmental education and wildlife observation and interpretation were formally determined compatible with Refuge purposes. The Refuge Manager also determined dog walking, bicycling, and jogging not compatible with the Refuge purposes, citing unacceptable impacts from those activities on its biological resources.

Non-wildlife-dependent use that now occurs on the Refuge includes dog walking, bicycling, jogging, using ORVs on the barrier beach, berry picking, and horseback riding. In-line skating now occurs on the runways, and at least five aircraft have landed since 1986. Completing the runway restoration project should eliminate the possibility of unauthorized aircraft landings.

An important Memorandum of Agreement (MOA) between the Service and Frosty Drew Nature Center, a non-profit organization with a facility in Ninigret Park, offers wildlife observation and environmental education for up to 2,500 people each year. Students range from school-aged children to senior citizens, but this partnership provides a particularly valuable opportunity to reach young students. The Center operates on a first-come, first-served basis, and consistently has more demand for programs than it can handle with current staff.

Trail System

Until 1997, the three asphalt runways and two taxiways from the former naval air station composed approximately 5 miles of an 8-mile trail system on the Refuge. All three runways provided visitors access to the shoreline of Ninigret Pond. The grasslands restoration project began removing the old runway in 1997, except for an 8'-wide swath that forms the base of the new trail system, which will be 3.8 miles in length. In addition to runways, the trail comprises old roads from the former Champlin Farm and from the naval base.

We also plan interpretive displays and kiosks to share information on landscape formation by glaciers, Native American use, naval aviation history, and colonial farming. Once completed, this "Trail Through Time" will involve a partnership among the Narragansett Indian Tribe, the Charlestown Airfield Memorial Committee, and the Frosty Drew Memorial Fund. One viewing platform overlooks Ninigret Pond at Grassy Point. A second viewing platform planned for the Foster Cove area has not been funded. Two kiosks stand along the east and west entrance and parking areas.

We have scheduled improvements to the Refuge entrance road in 2000, using Transportation Equity Act funds. Improved signs directing visitors to Ninigret Refuge are needed on U.S. Route 1. Current signs do not meet Refuge System standards, and visitors have commented that the existing highway sign, which reads "Ninigret Park Wildlife Refuge", causes confusion with the adjacent, town-managed Ninigret Park.

Contaminants and Military Debris

In addition to the CERCLIS sites listed in Part 1, a tremendous amount of miscellaneous military debris exists on Ninigret Refuge, including the concrete light fixtures along the runways, the concrete hard stand (machine gun backstop), small buildings like the cinder block pump house and hydrant and several old bunkers, the explosives magazine, a number of telephone poles, an old gate, and concrete-reinforcing mesh.

Of particular interest is a simulated wooden aircraft carrier deck, complete with steel catapult rail. Shrubs have overgrown the deck, except for one portion intersected by a trail, and many of its timbers are rotting in the ground, but the catapult is still visible. Aviation interest groups have proposed it as a feature worthy of interpretation. The Aviation Historical Society (RI) has suggested that this simulated deck may be the only one of its type remaining. We may include it as a stop on an interpretive trail.

Military construction moved a lot of earth on Ninigret Refuge, leaving scattered piles of dirt and boulders. One of the runways was extended by backfilling between Hunter's Island and the mainland. Much of that fill was never capped, and is exposed in many areas.

Chafee Refuge

Physical Resources

Topography and Hydrology

The Narrow River, which forms Pettaquamscutt Cove, has a geologically complex origin. In general, the tidal river and surrounding uplands are remnants of an ancient river valley carved out by glaciation approximately 10,000 years ago. Technically, the Narrow River is an estuary or a lagoon (RI CRMC 1998).

The eastern side of Chafee Refuge slopes sharply down to the Narrow River, with 15-percent (or greater) slopes along Tower Hill Road. Terrain on the



Pettaquamscutt Cove. USFWS photo

eastern side slopes more gradually, averaging 5 to 10 percent. In Pettaquamscutt Cove, the relief is low and near sea level. Bedrock is very close to the surface, the soil layer is thin, and depth to the water table is usually less than 3 feet (RI CRMC 1998). The channel between Narragansett Bay and Pettaquamscutt Cove is called “The Narrows.”

Narrow River Watershed: A significant source of information on the Narrow River watershed is the Narrow River Special Area Management Plan, Public Review Document (RI CRMC 1998). Water quality in the Narrow River, including Pettaquamscutt Cove, has been a long-standing issue. The University of Rhode Island Watershed Watch program has been conducting at least bi-weekly water quality monitoring since 1992. Three of their monitoring stations (NR-8, NR-9, and NR-10) lie immediately adjacent to the Refuge. Water quality has long been a focus issue for the Narrow River Preservation Association. Numerous other water quality studies have been conducted in the Narrow River watershed and are referenced in the Special Area Management Plan.

Beginning in 1959, the Narrow River has failed to meet state standards for total coliform bacteria levels. By 1994, the entire expanse of the Narrow River had been closed to shell fishing (RI CRMC 1998) and remains closed today.

Excessive nitrogen loading is another concern for the Narrow River; however, no State standards for nitrogen exist. Improperly functioning household septic systems are a major, documented source of both nitrogen and bacteria. Nitrogen and bacteria leach into groundwater, potentially affecting both private and public supplies of drinking water. This is significant, since up to 75 percent of the freshwater flowing into the system originates as groundwater (RI CRMC 1998).

Topography and Hydrology (continued)

Storm water runoff, commercial and residential fertilizer applications, and petroleum hydrocarbons from boating are all implicated in the water quality problems in the Narrow River (RI CRMC 1998). These sources will continue to increase with development in the watershed. At present, 65 percent of the watershed remains undeveloped, but it lies in one of the fastest growing areas of the State. The 35 percent of the watershed that has been developed is primarily residential. Approximately 14 percent of the watershed is designated open space, including the Refuge.

Biological Resources

Table 2-5. Land use/land cover at Chafee Refuge, Washington County, RI. (source: RIGIS)

<i>Cover-type</i>	<i>Acreage</i>	<i>Percentage</i>
Agricultural	8.2	2.6%
Brushland	6.5	2.0
Developed	7.6	2.4
Forest upland	115.3	36.1
Water	3.7	1.1
Emergent wetland	79.1	24.7
Forest wetland	74.8	23.4
Scrub-scrub wetland	22.8	7.1
Upland	1.8	0.6
Total	319.8	100%

Vegetation

Table 2-5 displays the various cover types dominating Chafee Refuge. Appendix C depicts this graphically, using information from the RI GIS land use-land cover database.

In the tidal salt marsh portions of the Refuge, the dominant vegetation types are salt meadow grass (*Spartina patens*), salt marsh cordgrass (*Spartina alterniflora*), spike grass (*Distichlis spicata*), saltwort (*Salicornia sp.*), and sea lavender (*Limonium nashii*). Several islands in the salt marsh are composed of black oak (*Quercus velutina*), with a poison ivy (*Rhus radicans*) understory. The uplands adjacent to the west side of the river are primarily forested by black oak and red maple, while the uplands on its

east side are dominated by red maple. A detailed plant list is available from the Refuge Office upon request (George 1999).

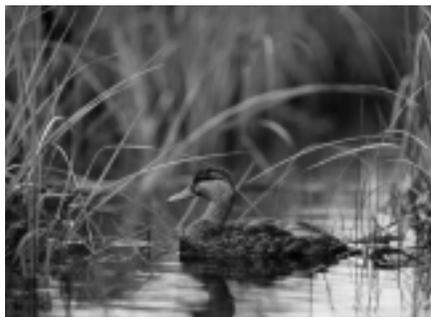
Threatened and Endangered Species

Piping plover, a federally listed species (threatened), and least tern, a State-listed species (threatened), nest at the mouth of the Narrow River, but have a limited presence on the Refuge. No other animals that are federal- or State-listed as threatened or endangered are found within the watershed.

The State endangered sea pink plant (*Sabatia stellaris*) is known in the vicinity of the Refuge along the Narrow River, but no surveys have been conducted to verify its presence on the Refuge.

Birds

Appendix D identifies bird species at Chafee Refuge. We lack formal surveys, which need to be done in the future, especially waterfowl surveys. Although the Refuge was established primarily to protect wintering populations of black ducks, we in fact know very little about black duck populations and use around the Refuge. Other waterfowl that commonly winter in the Narrow River watershed are mallards, canvasbacks, bufflehead, mergansers, Canada geese, and the non-native mute swan.



Black Duck. Chafee Refuge was established as a haven for black ducks. USFWS photo

Completion of the North American Waterfowl Management Plan (1986) elevated concern about black ducks. The plan identifies them as a species of “immediate, international concern,” and considers the protection of essential migrating and wintering habitats paramount. The Black Duck Atlantic Coast Joint Venture Plan identifies the Narrow River estuary (which the plan refers to as “the Pettaquamscutt River”) as the largest of 13 black duck focus areas in Rhode Island. Annual midwinter black duck population trend surveys across Rhode Island have confirmed a steady, and marked, decline in numbers since the 1950’s. Based on that trend information, black duck populations have declined by an estimated 83 percent in Rhode Island between 1950 and 1998 (USFWS 1998).

Other common salt marsh species found on the Refuge include sharp-tailed sparrows and red-winged blackbirds. Snowy egrets are often found foraging in tidal channels and salt marsh pools. There is at least one osprey nest in the watershed and as many as three pairs forage there.

The uplands contain a diversity of nesting and migratory songbirds, including common yellowthroat, eastern pewee, gray catbird, common grackle, American redstart, blue-winged warbler, and white-eyed vireo.

Invertebrates, Reptiles, Amphibians, and Mammals

No surveys have been conducted for these species on Refuge lands. The Narrow River Special Area Management Plan lists vertebrate species common to the Narrow River estuary.

Fish

Seventy-five species of fish have been documented to use the Narrow River at some point in their life history; 28 fish species and 5 shellfish species use the lower section of the river adjacent to the Refuge (RI CRMC 1998). Appendix A identifies trust fish species using the watershed. The Narrow River provides the largest alewife run of any river in Rhode Island (RI CRMC 1998).

Cultural Resources

No archeological sites have been recorded on the Refuge, but it is considered highly sensitive for both prehistoric and historic archeological resources.

Public Use

We have not monitored public use at Chafee Refuge; we estimate the number of visitors in 1998 at 5,000. Saltwater fishing was officially opened on the Refuge, in accordance with State laws, through a Federal Register Notice in 1998 (50 CFR 32). The Refuge has not been officially opened to any other public use. In general, monitoring and enforcement of public use policy is difficult because the entire Refuge boundary has not been posted. Visitors and Refuge staff alike are not always certain whether they are on Refuge lands.



Canoeing.

Although Chafee Refuge has not been opened officially to any activity but fishing, the Refuge still gets visitors. Known public use activities vary seasonally, but include wildlife-dependent activities such as birding, nature observation and photography, and recreational fishing. There are only a few vantage points within Pettaquamscutt Cove, and the most accessible ones are on private land. Popular viewing spots are the Town of Narragansett nature trail at the south end of the Cove near South County Museum, the Middle Bridge pull-out, and the Sprague bridge on Route 1A where it crosses the neck of the Narrow River inlet. Two waterfowl hunting blinds adjacent to Refuge lands in the cove may cause some activities incidental to hunting (e.g., retrieving birds) on Refuge lands, but none have been documented.

Non-wildlife-dependent activities suspected of impacting the Refuge include canoeing, kayaking, and using motor boats and jet skis. Motorized water craft operating in State waters within the cove likely contribute to shoreline erosion and disturb wildlife.

The Refuge has no public use facilities. Incidental use occurs on several unimproved trails that access the shoreline. Several residents adjacent to Chafee Refuge have a legal easement to go across the Refuge from their properties to the Narrow River. Ideally, Refuge staff would like to consolidate these easements into a location that will reduce impact to sensitive areas along the shoreline.

The RI Department of Transportation is developing a South County Bike Path along 7.2 miles of the old Narragansett Pier Railroad, which crosses the Refuge. The bike path will connect the towns of South Kingstown and Narragansett, and will be designed to accommodate cyclists, in-line skaters, walkers, joggers, and skateboarders. A swath up to 40 feet wide will be cleared for the 12-foot wide asphalt path. Its design is based on an expected peak of 400 users a day.

The Town of South Kingstown owns most of the old railroad right-of-way. The first segment connects Kingston train station to Peace Dale; the second segment connects Peace Dale to Wakefield; the third segment links Wakefield to Narragansett; and the fourth links Sprague Park to the Narragansett coast.

The proposed location of the third segment crosses approximately 600 feet of Refuge land. Refuge staff and the RI DOT are now discussing design alternatives to minimize impacts to Refuge lands. They have not yet reached a conclusion.

Sachuest Point Refuge

Physical Resources

Topography and Soils

Formerly an island, Sachuest Point is now a prominent headland separating Sachuest Bay to the west from Sakonnet River to the east. The uplands are gently sloping and appear generally flat, but dip sharply to the shoreline. The Refuge has the appearance of a hammerhead, with Sachuest Point to the southeast and Flint Point to the northwest (**Map 1-1**).

Upland soils at Sachuest Point are a thin mantle of broken-down outcropping bedrock, mixed with deposits of sand and silt, producing loose, acidic soil of

poor fertility. Underlying the soil are Carboniferous Period rocks containing outcrops of Dighton Conglomerate of the Rhode Island formation, volcanic schists, and white quartz intrusions. Most soils are Newport and Pittstown silt loams, very poorly drained and varying in slope from 0 to 15 percent. Also present on the Refuge are areas of Newport very stony loams. Rocky outcrops ring the perimeter of the Refuge, and several areas of fill are located in the salt marsh on its northwest corner.

Historical land use practices likely impacted the soils of the Refuge, although no seriously compacted soils or expanses of soil loss have been noted. From the mid-1600's until the early 1900's, Sachuest Point was used for farming, including sheep grazing. This continued until World War II, when approximately 107 acres of the property became an Army Coastal Defense site, including a Navy firing range. More recently, the U.S. Navy operated a Naval Radio Station Receiver Site there.

Hydrology

Sachuest Point is apparently the remnant of a drumlin, and was at one time an island separated from the mainland by shallow marshes. Groundwater on Aquidneck Island generally moves east towards the Sakonnet River, or west towards Narragansett Bay. The groundwater moves from areas of recharge to areas of discharge, unless intercepted by wells. Areas of discharge include springs and seeps located along the bottom of streams, ponds, lakes, and reservoirs.



Harlequin duck. *The rocks off Sachuest Point have the largest wintering population of harlequin ducks in southern New England. USFWS photo*

Biological Resources

Salt marsh

Approximately 40 acres of Sachuest Point are salt marsh wetlands. Remnants of a salt marsh are found on the northeast end of the Refuge, but have been severely impacted by the landfill and a road. The southern, largely freshwater portion of the salt marsh has been overtaken by the invasive plant Phragmites. In 1997, extensive baseline data was collected on the Phragmites patch and adjacent vegetation community in anticipation of salt marsh restoration (Roman, et al. 1997). The primary goal of the restoration was to restore a natural tidal flow into the salt marsh and thus, reduce the domination of Phragmites in the plant community.

Actual restoration work began in 1998 on the south side of the road between Second and Third Beaches. Initial monitoring shows native plants returning to areas where Phragmites was mechanically scarified or exposed to a more natural tidal flow of salt water. Some of the Phragmites is dying and showing signs of poor vigor. The upper reaches of the salt marsh along Paradise Brook, however, are

Table 2-6. Land cover at Sachuest Point Refuge, Newport County, Rhode Island (source: aerial photo interpretation by J. Stone).

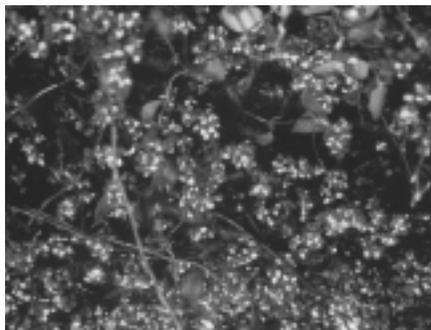
Cover-type	Acreage	Percentage
Cobble beach	5.0	1.9%
Developed	16.1	6.3
Exposed rock	4.8	1.9
Native emergent wetland	9.5	3.7
Native forest upland	0.4	0.2
Native grass	17.4	6.3
Native shrub upland	70.3	27.5
Native shrub wetland	1.2	0.5
Non-native emergent wetland	28.1	11.0
Non-native forest upland	0.4	0.2
Non-native grass	10.1	4.0
Non-native shrub upland	64.8	25.3
Sand	6.6	2.6
Vegetated sand dunes	13.3	5.2
Water	8.1	3.2
Total	256.1	100%

still highly impacted by freshwater, as freshwater from the brook is being pushed up the tidal channels during high tide. It will be more difficult to control Phragmites there.

Vegetation

Table 2-6 displays the dominant land cover types for the Refuge. Appendix C displays this same information graphically, based on interpretation of 1995 aerial photos. Compared with other locations in Rhode Island, vegetation on Sachuest Point Refuge is relatively homogeneous, with an estimated 150 plant species. A detailed plant list for the Refuge is available upon request from the Refuge Office (George 1999). Principal vegetation types are shrub land dominated by the invasive exotic, Asian bittersweet (*Celastrus orbiculatus*), and open fields dominated by forbs like goldenrod. Small patches of switchgrass also occur throughout the Refuge.

Of the 150 estimated documented plant species for Sachuest Point Refuge, an incredible 40 percent are invasive species covering approximately 80 percent of the Refuge. The issue of how to control invasive plants is probably its most significant management concern. So far, little control of invasive species has occurred.



Invasive plants. *Asian bitterweet*, a non-native, invasive species, is found on virtually every acre of uplands at Sachuest Point Refuge. USFWS photo

Restoring salt marsh tidal flows in 1997 was the first real effort to deal with Phragmites on this Refuge. Informal monitoring has indicated a reduction in the vigor and amount of Phragmites.

In 1998, prescribed burning was conducted on three acres to determine if this was a viable tool for controlling Asian bitterweet. Asian bitterweet is present on virtually every acre of upland. Results were poor, due to lack of dry fuels. In 1999, approximately 15 acres of Asian bitterweet were hydroaxed and mowed as an experimental control technique to be monitored. It is too soon to interpret results for these projects; monitoring will continue.

Also in 1998, approximately 6,000 beetles were released as a biological control agent for purple loosestrife (*Lythrum salicaria*).

Threatened and Endangered Species

No State- or federal-listed threatened or endangered animal species are known to breed in the immediate area. A 1990 survey for American burying beetles at Sachuest Point Refuge found other *Nicrophorus* species there, but not the burying beetle.

Sachuest Point Refuge is a historic site for sea beach amaranth (*Amaranthus pumilus*), a federally listed plant species (threatened). No State-listed plants are known.

Several State-listed species are known to forage in the area, including northern harrier, great blue heron, snowy egret, great egret, and glossy ibis. Sachuest Point Refuge was probably historical nesting habitat for grasshopper sparrows and upland sandpipers, both of which are State-listed (Ferren, in press). The peregrine falcon (*Falco peregrinus*), formerly federal-listed, sometimes uses the Refuge for roosting or foraging during migration. None of these species are known to breed on the Refuge.

Birds

Appendix D presents the bird species that use Sachuest Point Refuge during each season. Bird diversity varies little among habitat types during the breeding season. Abundant nesting species include red-winged blackbird, yellow warbler, song sparrow, American robin, and common yellowthroat. As shrubs have continued to dominate the landscape, breeding bird communities have changed. Gray catbird, northern oriole, brown thrasher, rufous-sided towhee, and American redstart have been detected on recent breeding bird surveys, yet these same species could not be found on the Refuge 3 years ago. Island Rocks, just off the eastern point, is habitat for common terns.

Birds (continued)

Osprey

Few formal surveys for wintering or migratory landbirds have been conducted for this Refuge. Migrants vary yearly, but typically include thousands of tree swallows, snow buntings, and various warblers, thrushes, and vireos. Remaining grasslands and trails provide foraging areas for a variety of wintering and migratory raptors. No raptors currently nest on the Refuge, but because of Sachuest Point's location, a large diversity of raptors are seen during migration. Migrant raptors typically observed include peregrine falcon, American kestrel, merlin, broad-winged hawk, osprey, red-tailed hawk, sharp-shinned and Cooper's hawks.

The Refuge shoreline is also an important place for migrating and wintering shorebirds, including sanderlings, purple sandpipers, dunlin, and semipalmated plovers. Disturbance of feeding shorebirds along Second and Third Beaches is a concern, since very little habitat for these species remains on Aquidneck Island.

Wintering songbirds include yellow-rumped warblers, white-throated sparrows, and dark-eyed juncos. Sachuest Point is a reliable spot for viewing wintering snowy and short-eared owls and northern harrier. Wintering sea ducks are perhaps the most popular attraction for visitors to the Refuge. Sachuest Point boasts the second largest winter population of eastern harlequin ducks on the Atlantic coast. Only one site off the coast of Maine has a larger winter concentration. Annual surveys at Sachuest Point Refuge indicate the number of harlequin ducks fluctuates from 50 to a high of 107 from October through March each year (see **Table 2-7**).

Table 2-7. Peak winter counts for harlequin duck at Sachuest Point Refuge from 1994 - 1999.

<i>Year</i>	<i>Peak count</i>
1992	64
1993	77
1994	77
1995	82
1996	82
1997	84
1998	107
1999	105

The harlequin duck is one of the least studied ducks in North America, because it breeds and winters in some of the most inaccessible and remote habitats in the northern hemisphere (Alaska Department of Fish and Game 1994). Harlequin ducks congregate off the eastern side of Sachuest Point, feeding and roosting near the area known as Island Rocks. Since they expend considerable energy feeding in rough waters, they can often be seen perching on rocks to rest or sleep. They forage on a variety of intertidal invertebrates gathered from rocks and ocean-bottom close to shore.

Throughout their range, harlequin duck populations have increased slightly over the last 10 years, but they remain endangered in Canada. Recent attempts to list their Eastern States population were determined unwarranted (USFWS 1998). Studies are now underway to better understand habitat use and impacts at nesting locations in Canada and at wintering locations along the eastern seaboard.

Table 2-8 summarizes peak numbers for the incredible diversity of waterfowl observed off Sachuest Point over the last eight years.

Table 2-8. Peak waterfowl numbers at Sachuest Point Refuge from 1992 to 1999.

	1992	1993	1994	1995	1996	1997	1998	1999
Mute swan	2	3	10	2	2	1	4	5
Brant	75	20	34	7	58	3	20	3
Canada goose	40	2	1	-	-	37	-	-
American black duck	37	35	65	61	160	116	26	-
Mallard	-	-	-	-	4	-	2	-
Gadwall	-	-	-	-	-	-	16	11
American wigeon	2	-	2	-	-	2	-	-
Greater scaup	36	44	33	28	34	57	53	63
Lesser scaup	-	-	-	-	-	80	-	-
Common eider	207	77	1030	550	762	76	3011	312
King eider	-	-	1	-	-	27	-	-
Harlequin duck	64	77	77	82	82	84	107	105
Oldsquaw	-	-	3	-	-	1	-	2
Black scoter	-	57	300	58	28	29	21	32
Surf scoter	-	101	167	88	102	319	368	53
White-winged scoter	-	57	115	5	10	20	61	62
Common goldeneye	28	106	78	132	78	87	-	143
Barrow's goldeneye	1	1	1	-	-	-	-	-
Bufflehead	7	29	26	38	62	44	117	165
Common merganser	-	-	-	-	-	-	27	97
Red breasted merganser	77	51	61	49	37	70	43	47
Ruddy duck	4	-	23	-	-	30	-	43

Mammals



Red fox. Red fox can become easily habituated to human activity. USFWS photo.

Nine species of mammals have been observed on the Refuge, including white-tailed deer, red fox, raccoon, striped skunk, eastern cottontail, eastern meadow vole, and white-footed mouse.

Mink (*Mustella vison*) have also been seen on Refuge trails, and harbor seals (*Phoca vitulina*) are frequently seen hauled out on rocks along the shoreline. Overly friendly fox have been an issue on the Refuge, as visitors have been observed feeding them.

Reptiles and Amphibians

No formal surveys of reptiles and amphibians have been conducted on the Sachuest Point Refuge. Most sightings have been opportunistic, and therefore represent an incomplete list of what is found on the Refuge. Eastern milk snake, northern brown snake, and eastern garter snake have been observed on Refuge trails. Recently, northern leopard frog (*Rana pipiens*) were observed near the salt marsh on the Refuge. Spring peepers have been heard in the Refuge wetlands; no salamanders or turtles have been documented.

Cultural Resources

No archaeological sites on Sachuest Point have been recorded, but we consider Sachuest Point Refuge highly sensitive. No comprehensive surveys have been conducted for this Refuge, but two prehistoric archeological sites have been submitted to our Regional Historic Preservation Officer for designation.

Public Uses

Estimated public use for Sachuest Point Refuge in 1998 was 65,000 total visitor days. As stated earlier, there is no consistent process on the Refuge Complex for collecting and documenting visitation data. Estimating night surf fishing is particularly challenging.

Renovations to the visitor center will include exterior and interior redesigns with significant improvements, especially to exhibits. The impressive number of visitors offers great potential to educate and inform them about the Refuge Complex and the Refuge System. Volunteers primarily have staffed the center since the 1980's. Although we need to station one permanent staff and at least one seasonal staff there to establish a year-round presence and to meet the tremendous number of requests for environmental education and interpretive programs, there has been no funding to support full-time staff at Sachuest Point Refuge.

Known public use activities vary seasonally, but include wildlife-dependent activities such as nature observation and photography, environmental education and interpretation, and salt water fishing. Birdwatching is the year-round primary attraction. Salt water fishing includes striped bass and bluefish in late summer and fall. Other fish taken include flounder, tautog, and scup. The Refuge is not open to hunting.

Non-wildlife-dependent activities now occurring include dog walking, jogging, swimming and sunbathing. Second Beach and Third Beach are immediately adjacent to the Refuge, and beach users often spill over onto the Refuge, sometimes unknowingly, since boundary signs have a way of disappearing. Litter and random access to the shoreline are constant issues.



Tree rings

In 1994, the Refuge Manager formally determined dog walking, bicycling, jogging, swimming and using the beach were not compatible with Refuge purposes. Because of the lack of a permanent Service presence, enforcement against these incompatible public uses has been inconsistent.

The Norman Bird Sanctuary is located adjacent to the Sachuest Point Refuge. Refuge staff and volunteers work closely with the Sanctuary, occasionally sharing volunteer hours. The Sanctuary operates a summer camp, a visitor center, and provides nature walks and family programs.

Trail System

Approximately 3 miles of trail exist on the Refuge, none of them ADA-accessible. Trails maintenance includes extensive mowing, brushing, and repairing erosion damage. One kiosk stands at the junction of several trail heads just off the parking lot. The Flint Point trail, Island Rocks trail, and the Sachuest Point trail each have one observation platform. We need to evaluate the Sachuest Point Refuge trail system to determine whether all of its current trails are necessary.

The entrance road to the Refuge will be improved with Transportation Equity Act funding. We expect repaving to begin in 2000.

Trustom Pond Refuge

Physical Resources

Topography and Soils

The terrain at Trustom Pond Refuge is gently rolling and slopes south to the ocean. Slopes are generally less than 5 percent. The Refuge is located on a coastal outwash plain created by glacial meltwater carrying and depositing unsorted till and sorted sand, gravel, silts, and clay. Most soils on the Refuge are silt loams in the Bridgehampton and Enfield series. Other areas, which were maintained as pasture but were not cultivated, are stony loams in the Charlton series.



Trustom Pond. USFWS photo

Hydrology and Water Quality

Trustom Pond is a 160-acre brackish coastal pond that serves as the centerpiece of the Refuge, and has the distinction of being the only coastal pond in Rhode Island without houses on its shoreline. It is also the only coastal salt pond in Rhode Island that lies entirely within a national wildlife refuge, and whose waters are fully managed by the Service. The pond varies between 1 to 6 feet in depth, with substrates varying from mud to coarse sands. There is no permanent breachway; however, we mechanically breach the pond at least once a year, usually in early April, primarily to provide foraging habitat for piping plovers and other shorebirds. Natural breaching occurs periodically as an overland sheet flow during periods of extreme high water. The watershed feeding Trustom Pond is estimated at 794 acres (RI CRMC 1998).

During high water, Trustom Pond flows into adjacent Card's Pond, a 43-acre brackish coastal pond. Card's Pond averages 1.5 feet in depth. The Refuge boundary includes roughly the southwestern one-sixth of its perimeter. There is no permanent breachway in Cards Pond; however, we breach it mechanically eight to ten times throughout the year, primarily in response to landowners' concerns about the high water table backing up into their septic and well systems. The watershed feeding Card's Pond, estimated at 1,820 acres is much larger than Trustom Pond's watershed (RI CRMC 1998).

Rhode Island Salt Pond Watchers, a volunteer group, has been monitoring water quality on Trustom Pond for at least 10 years. Other water quality studies have also been done, including a study conducted by the RI Department of Health (1991). Both nitrogen and bacterial contamination in the pond are concerns. The RI DOH study found concentrations of fecal coliform bacteria that exceeded shell fishing standards in both Trustom Pond and Card's Pond.

In both ponds' watersheds, most of the residential and commercial development lacks sewer systems, relying instead on individual septic systems, as is the case with Ninigret Pond. Older, failing septic systems are suspected of being the leading cause of nitrate, nitrogen, and bacteria loading in coastal ponds (RI CRMC 1998). Other likely causes include storm water runoff in the watershed, domestic pets, and the summer populations of Canada geese and mute swans, who are confined to the ponds while molting. A single mute swan can produce about 2 lbs. of manure a day!

Nitrogen loading results in extensive macro algae buildup. During the summer, both ponds are thick with macro algae and phytoplankton, which cover the bottom in a thick mat and form an anoxic zone (RI CRMC 1998). One significant impact of algal blooms is that they reduce the abundance and density of submerged aquatic vegetation (SAV) by decreasing the amount of light transmitted through the water column. SAV is a critical food source for an array of aquatic and terrestrial animals (see Vegetation, below). Since 1978, SAV beds have been declining in Trustom Pond (Harlin, et al. 1995).

Biological Resources

Wetlands

Freshwater wetlands of various types account for about 70 acres, or 11 percent, of Trustom Pond Refuge. Five freshwater ponds totaling about 8 acres occur on the Refuge. The largest of these, the 4-acre "mud pond," lies along Moonstone Beach Road. The only man-made pond is a small farm pond created when the former owners of the farm dammed a small creek drainage near the present Refuge maintenance facility.

Barrier beach habitat (also referred to as "beach strand" habitat): Coastal development and shoreline stabilization have been the major causes of sand dune loss and the rapid decline of barrier beaches along the Rhode Island coast. One of the State's few remaining undeveloped barrier beaches is Moonstone Beach, 1.3 miles long. Changes in its width have been an increasing concern since 1985, when it began steadily declining (URI 1996). Without the natural processes of sand removal and replenishment, beach loss occurs. Since 1961, beach profile surveys at Moonstone and other beaches on the South Shore have documented widespread decline in sand volume. When dune habitat is lost, the barrier beaches cannot absorb large waves, and lack the volume of sand required by adjustments in beach profile during storms.

Intense summer recreational use of Moonstone Beach and other barrier beaches exacerbates the impacts on these fragile ecosystems. People continue to walk on the dunes at Moonstone Beach, despite Refuge signs that prohibit it. Pedestrian traffic destroys stabilizing vegetation and contributes to dune erosion. The beach also provides important nesting habitat for piping plovers and least terns. In order to protect these species, Moonstone Beach, above the mean high tide line, is closed to public use from April 1 to September 15 each year. (*See piping plover, below.*)

Vegetation

Trustom Pond Refuge contains a diverse collection of vegetation cover-types (**Table 2-9**). Appendix C contains a cover-type map. Red maple swamp is the dominant freshwater forested wetland cover type. A detailed plant list for the Refuge is available from the Refuge Office upon request (George 1999).

Submerged Aquatic Vegetation (SAV)

Widgeon grass and sago pondweed dominate in the aquatic vegetation of Trustom Pond (Harlin & Thorne-Miller 1978 and Harlin, et al. 1995). A 1995 survey found that these plant populations had decreased drastically since the original survey in 1978. In 1996, researchers found an increase in SAV abundance and diversity over 1995 levels. We need to continue monitoring SAV levels to determine the reasons for fluctuations, and outline the relationships among nutrient loading, breaching cycle, and turbidity.

Grasslands

Table 2-9. Land cover at Trustom Pond Refuge, Washington County, Rhode Island (source: aerial photo interpretation by J. Stone).

Cover-type	Acreage	Percentage
Agriculture	18.9	2.9%
Developed	5.0	0.8
Exposed rock	4.2	0.7
Native emergent wetland	5.1	0.8
Native forest upland	209.3	32.6
Native forest wetland	34.8	5.4
Native grass	94.6	14.7
Native shrub upland	26.2	4.1
Native shrub wetland	7.8	1.2
Non-native emergent wetland	25.0	3.9
Non-native forest upland	0.1	-
Non-native shrub upland	13.4	2.1
Sand	18.0	2.8
Vegetated sand dunes	12.1	1.9
Water	168.0	26.1
Total	642.5	100%

Following completion of the Trustom Pond Refuge Grasslands Management Plan (1995), the Refuge has systematically converted former hayfields and crop lands (corn and potato) to native grasses for the benefit of grassland nesting birds. We have now restored 85 acres of a targeted 125 acres of little bluestem and big bluestem grasslands on the Refuge. Under a cooperative agreement with the Meyer family, 40 acres were restored on adjacent private property, with plans to restore another 15 acres within 2 years.

The restoration process converts old fields by discing (with an offset harrow), plowing, harrowing, packing (using a roller), fertilizing, and seeding them before June. The original seed mix used was typically big bluestem (50 percent), little bluestem (20 percent), Indian grass (20 percent), and switchgrass (10 percent). Recently, the seed mix is primarily little bluestem, using the other species more sparingly depending on the topography, soils and hydrology. Weeds are chemically treated with herbicides, generally soon after germination.

A combination of mowing and burning has maintained the newly established grasslands. An experimental burn in Field 6 in 1998 had very promising results. The burn was designed to consume dead vegetation and control weeds. Established fields are mowed twice in the first year for weed control. Horseweed and ragweed are the principle problem species. Current management strategies require that restored grasslands be mowed or burned every 3 to 5 years to control woody vegetation. We monitor during both the growing and dormant seasons using photo points and Robel pole readings. A Trustom Pond Grasslands Progress Report (1998) makes several recommendations about the mix of seed and the timing of burning, mowing, and herbicide application (Flores 1998).

Shrublands and Forest



Bayberry.

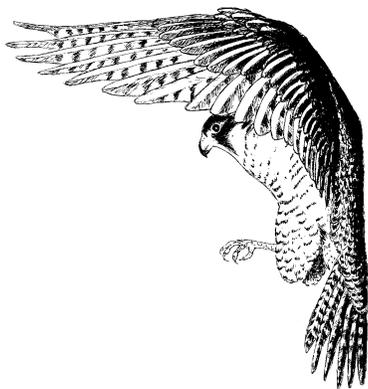
Shrublands and forest compose 39 percent of Trustom Pond Refuge, mostly on its western portion. Shrublands are dominated by shadbush, northern arrowwood, and bayberry, whereas forests are dominated mainly by red maple and black oak. We brush-hog approximately 5 acres of old field brush land (formerly sheep pasture), primarily composed of Autumn olive and black cherry. It is too rocky to maintain as grasslands, and is being maintained as early successional shrub habitat.

Invasive Plants

Invasive species have several strongholds on the Refuge. Phragmites is found around much of the edge of Trustom Pond, and is impacting the population there of State-listed sea pink (*Sabatia stellaris*, endangered); autumn olive is found on the edges of most fields; honeysuckle are found on the edges of shrublands and forest; and Asian bittersweet is found along hedgerows adjacent to fields. Phragmites dominates approximately 25 acres of emergent wetland; invasive plants dominate at least 14 acres of upland on the Refuge.

Herbicide treatments and mechanical control on approximately 5 acres of Phragmites on the eastern side of Trustom Pond involved spraying with Rodeo and removing dead vegetation by mowing and burning. Follow-up treatments have been inconsistent, and some regrowth has occurred.

We have attempted to control autumn olive in recent years by using a farm tractor to push the shrubs over and then burning them. We have also applied cambial treatments of Garlon 3A directly to the stems.



Peregrine falcon.

Piping plover is the only federally-listed species breeding on Trustum Pond Refuge. Other endangered species use the Refuge during migration: bald eagle (*Haliaeetus leucocephalus*), roseate tern (*Sterna dougalli*), and the recently de-listed peregrine falcon. Management and protection for piping plovers is a priority for the Refuge Complex. Tremendous resources are channeled into protecting and monitoring nesting beach habitats, both on Moonstone Beach and non-Refuge beaches along the South Shore. It is important to recognize that many other shorebird species benefit from piping plover management as well, especially the State-listed least tern (threatened). A description of plover management programs both on the Refuge and on other South Shore beaches follows.

Refuge Plover Program

Since 1982, Refuge staff have protected nesting piping plover and least tern on Moonstone Beach by using different combinations of beach closures, law enforcement, biological monitoring, predator exclosures, and predator control. The colorful history of those management techniques spans public acceptance, support, protests, and lawsuits. The Compatibility Determination for Piping Plover Management on Trustum Pond Refuge (1990) and the Refuge Annual Narratives of the 1980's describe that management in detail.

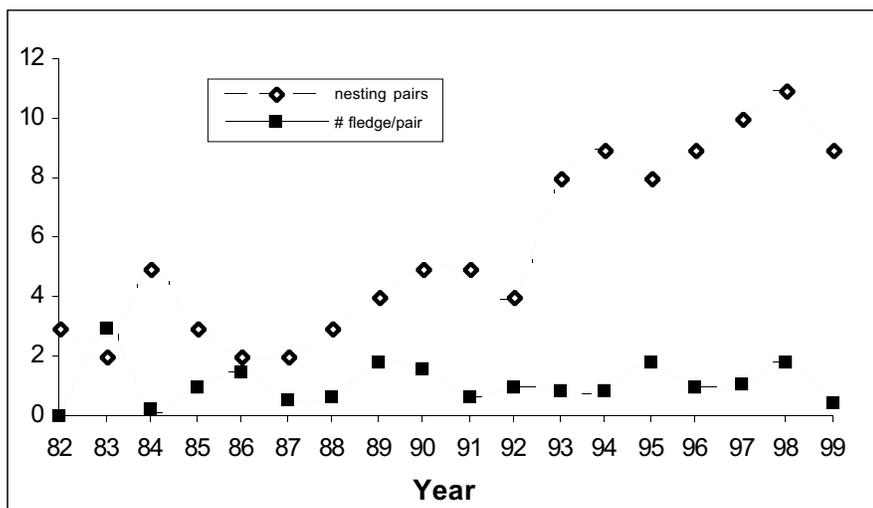


Figure 2-3. Nesting pairs and fledging rate per pair of piping plovers on Moonstone Beach, Trustum Pond Refuge. In 1999, the estimated carrying capacity of this site was 10 nests (Hecht 1999).

Before 1982, the Refuge owned 2,640 feet of beachfront, but did not record nesting details, although observations in May of nesting plover have been documented. No restrictions on public use were in force at that time. In 1982, the Audubon Society transferred its former Moonstone Waterfowl Refuge to the Service, extending the Refuge beachfront to 1 mile.

During the 1982 nesting season, we fenced individual, active nest sites in that mile of beach with oak posts and single strand wire, and posted warning signs. We allowed public use, including sunbathing, to continue on the remainder of the beach. During

the breeding season, sunbathers would lie right up against the fencing, and both beach users and their dogs frequently trespassed in the fenced areas. All three plover pairs abandoned their nests.

In 1982, the New England Naturist Association filed a lawsuit in federal court against closing Moonstone Beach. The lawsuit was dismissed, but protests by this group and other beach users continued for several seasons.

In 1983, 1984, and 1985, we closed three-quarters of a mile of the entire beach, fencing it with double strand wire mounted on posts to prevent public use from the western Refuge boundary to the eastern edge of Trustom Pond breachway. The beach closure extended from May 1 through August 31 (nesting season). We hired a Biologist Aide to monitor nest sites and inform the public about the closure. Law enforcement personnel were present on weekends. In 1985, we replaced the wire strand fencing with wire mesh fencing, to ensure that the public and their dogs would stay out, and began trapping predators.

In 1986 and 1987, we posted 800 feet of beach east of the Trustom Pond breachway, in addition to the three-quarters of a mile already posted. In 1986, the piping plover became a federally listed species under the Endangered Species Act. That listing increased management concern for plover, legally obligating the Refuge to ensure plover protection and restoration.

A Master Plan for Trustom Pond Refuge (January 1988) stipulates that all public use activities cease on Moonstone Beach above the mean high tide line. That plan also proposes "...to seek a management agreement with the State of Rhode Island prohibiting public use of the intertidal zone adjacent to the Refuge between April 1 and August 31."

In 1988 and 1989, we fenced all of the Refuge beach from April 6 to August 31, except a 137-foot section under permit to the Town of South Kingstown to operate a public beach. The RI CMRC issued the Refuge a Notice of Violation for constructing a fence without filing a consistency determination. The New England Naturists Association also filed a request for a preliminary injunction in federal court to stop the fencing. The court denied the injunction (C.A. No 88-0218T). A new group, Taxpayers for Access to Moonstone Beach, surfaced with a petition requesting that the Service reopen Moonstone Beach. The beach, however, remained closed.

A Piping Plover Management Compatibility Determination (1990) for Trustom Pond Refuge acknowledged that the Master Plan of 1988 had not been fully implemented. Its findings determined that Moonstone Beach be closed to all public entry above the mean high tide line, from April 1 through September 15; that fencing be erected around the closure area; that no sunbathing or other non-wildlife-dependent recreational activities be permitted; and, that no permit be issued to the Town of South Kingstown to operate a public beach on Refuge land.

The current plover management strategy at Moonstone Beach began in 1990, and includes:

- Erecting symbolic fencing to close the beach to public use above the mean high tide line from April 1 to September 15;
- Providing an outdoor exhibit with information on plover and their management;
- Erecting observation platforms for monitoring nests;
- Erecting predator exclosures around nests;
- Erecting predator drift fencing on the back side of the dunes to direct predators away from the beach nesting sites;
- Using law enforcement officers to patrol the beach during the closure period;
- Monitoring the activities of piping plover nests and chicks; and
- Controlling mammalian predators like red fox, coyote, mink, long-tailed weasel, skunk, opossum, and raccoon through selective trapping.

The Town of South Kingstown owns a 50'-wide section of beach, directly out from the end of Moonstone Beach Road.

Since 1982, when plover management began on Trustom Pond Refuge, plover nesting has increased from a low of 2 pairs to a high of 11 pairs. However, fledgling rates per pair have stayed relatively constant.

In 1999, we assessed the current condition of piping plover habitat in a field review of Moonstone Beach, Maschaug Beach (a.k.a. East Beach, Watch Hill), and approximately one-third of Ninigret Beach, including all of the Ninigret Refuge barrier beach (Hecht, et al. 1999). They ranked those beaches using the "Habitat Ranks and Provisional Density Objectives for Breeding Piping Plovers in Massachusetts (Mass DFW 1996)". Rankings were assigned solely on physical and vegetative attributes of habitat, without regard to observed or reported sources of human disturbance or predation.

They estimated that Trustom Pond had a "provisional abundance objective" of 10 nesting pairs. This should be interpreted as a maximum carrying capacity based on physical attributes only. Hecht noted the carrying capacity is subject to rapid change due to storms, changes in sand deposition and erosion patterns, and other beach-forming processes. The Revised Recovery Plan (1996) also lists an estimated carrying capacity of 10 pairs.

Significant information needs for effectively managing plover remain, primarily related to the control of mammalian predators, which are the suspected major cause of plover loss at Moonstone Beach. Information on control methods, predator populations, the effects of aversive conditioning on predators, the effectiveness of dawn and dusk "guarding" of nest sites, and the seasonal availability of food for plover are all critical information needs.

South Shore Plover Program

Since 1992, Refuge staff have helped monitor sites and protect piping plover on as many as nine other beaches along the South Coast. This highly successful cooperative management has resulted in a dramatic increase in the number of nesting plover and fledged chicks. The off-Refuge plover protection program relies primarily on grants and cooperative funding with RI DEM. An annual report summarizes each year's statistics for nesting pairs and productivity and other relevant information on nesting sites, disturbance, and losses. It also recommends improvements in the program. These annual reports are available from the Refuge Complex office upon request. The latest is "Rhode Island Piping Plover Restoration Project:1999."

Off-refuge management resembles the on-Refuge program, with symbolic fencing of areas around the nest sites, exclosure fencing around each nest, monitoring nest activity, and educating the public on plovers and the problems associated with unleashed pets and litter. Since off-refuge management began in 1992, the number of nesting pairs has increased significantly at some sites. **Figure 2-4** provides a summary of each site.

The field evaluation conducted by Hecht, et al. in 1999, determined that Ninigret Beach (referred to in **Figure 2-4** as East Beach) has a provisional abundance objective of 20 pairs; Maschaug Beach (referred to in **Figure 2-4** as Watch Hill) has a provisional abundance objective of nine pairs. The Revised Recovery Plan (1996) listed estimated carrying capacities of 10 pairs and 8 pairs for Ninigret and Maschaug Beaches, respectively.

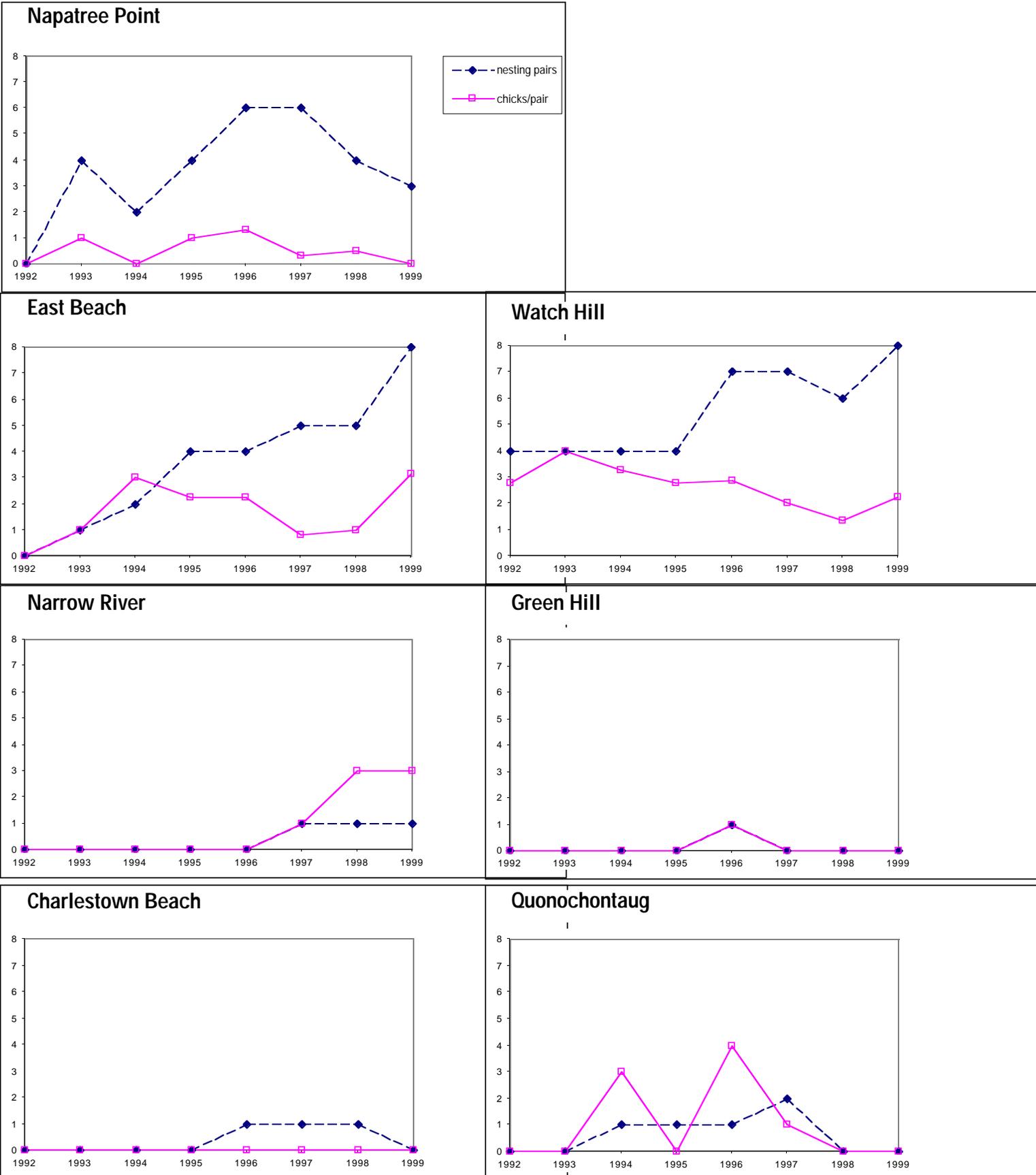
Least tern (*Sterna antillarum*), a State-listed species (threatened), has also benefitted from and responded favorably to strategies to protect nesting piping plover. At Moonstone Beach, exclosures around an entire tern colony and solar-powered electric fencing has been used to deter predators. Tern numbers on the beach have been increasing; RI DEM counted 160 individuals in 1998. Despite predator trapping, however, small mammalian predators like mink and red fox continue to significantly affect tern fledgling rates and adult survival. The fencing appears to be effective only against dogs; small mammals are able to get through. Terns do not always nest in the fenced area, further complicating their protection.

A variety of State-listed species are also found on the Refuge, predominately plants. These include wild coffee (*Triosteum aurantiacum*), hyssop-leaved hedge nettle (*Stachys hyssopifolia*), dragon's mouth orchid (*Arethusa bulbosa*), Indian grass, sea pink, and wood lily (*Lilium philadelphicum*). State-listed vertebrates found on the Refuge include four-toed salamander (*Hemidactylus scutellatum*) and osprey (*Pandion haliaetus*).

Birds

The diversity of vegetation and habitat types within Trustom Pond Refuge gives rise to a very diverse avian fauna. Appendix D lists, by season, resident and migratory birds using the Refuge.

Figure 2-4. Nesting success of piping plovers in coastal Rhode Island from 1992 to 1999. See **Figure 2-3** for nesting success at Trustum Pond.



Waterfowl

Trustom Pond is well known in southern New England as a premiere migrating and wintering spot for waterfowl. It is one of the few coastal ponds in Rhode Island where minimal public use near the pond offers an undisturbed resting area for waterfowl. For its size, the pond attracts a significant diversity of waterfowl, some species in very large numbers. **Table 2-10** displays peak numbers for waterfowl for the last eight years.

Shorebirds

Other than piping plover and least tern, many shorebird species also benefit from the seasonal closure of Moonstone Beach, particularly during fall migration. Appendix D lists species that stop on the Refuge during migration. Maintaining a beach closure through September 15 ensures that migrating shorebirds have an undisturbed rest area on Moonstone Beach.

Mute Swans

Mute swans are a non-native, invasive species of waterfowl introduced from Europe in the late 1800's. This species is very aggressive during nesting season, and will kill the young of other waterfowl nesting nearby. Adult swans produce about 2 pounds of manure per day, significantly increasing nutrient loading in the pond. Although it has not been proven conclusively, it is surmised that mute swans are a significant contributor to Trustom Pond water quality problems (see SAV, above).

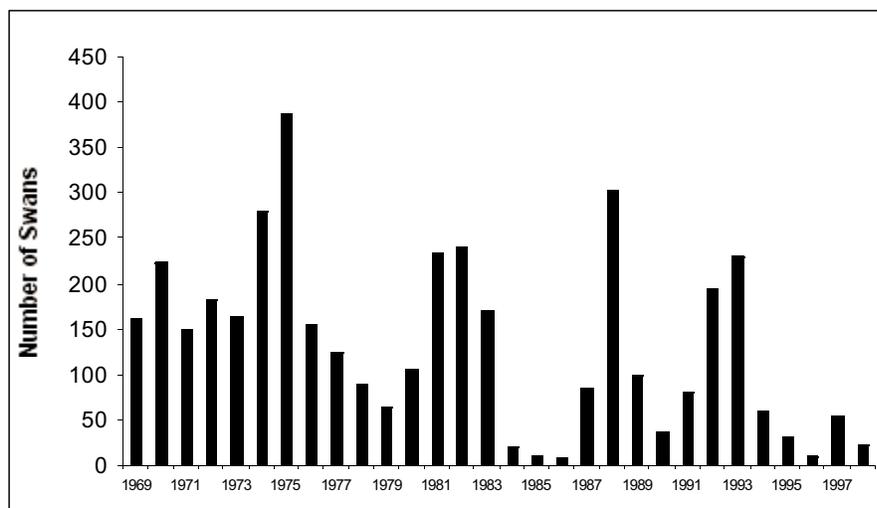


Figure 2-5. Peak mute swan use at Trustom Pond from 1968 to 1998.

Mute swan populations on Trustom Pond typically average five pair during nesting season, but increase dramatically during the summer, when the birds use the pond for molting. The swans remain flightless for several weeks until they grow new flight feathers. As depicted in **Figure 2-5**, mute swan numbers have been widely erratic, but generally have been declining since 1993.

Nesting mute swans have been actively controlled on Trustom Pond by adding eggs on the nest. RI DEM uses this method across the State to control swan numbers.

Table 2-10. *Peak waterfowl numbers on Trustom Pond Refuge from 1992 to 1999.*

	1992	1993	1994	1995	1996	1997	1998	1999
Snow goose	1	200	4	-	1	40	33	2
Brant	-	-	-	-	-	1	-	-
Canada goose	885	1000	581	342	1115	1000	775	1106
Wood duck	16	18	12	2	7	3	2	2
Green-winged teal	24	25	51	52	16	39	81	96
Blue-winged teal	14	5	20	2	-	2	-	20
American black duck	249	309	360	200	104	235	210	215
Mallard	92	185	193	78	41	406	73	93
Northern pintail	4	7	2	9	12	4	18	17
Northern shoveler	-	5	2	-	-	-	3	-
Gadwall	72	35	9	15	10	5	8	11
American wigeon	46	30	37	7	20	4	8	3
Canvasback	13	82	8	7	275	54	252	44
Redhead	-	3	-	1	-	18	12	2
Ring-necked duck	3	9	2	5	4	10	7	2
Greater scaup	1260	801	332	375	420	551	470	500
Lesser scaup	1	1	-	265	196	250	568	-
Common eider	4	-	-	800	2500	75	300	75
King eider	-	-	-	-	-	-	1	1
Harlequin duck	-	-	-	1	-	-	-	-
Oldsquaw	1	-	-	-	2	-	-	-
Black scoter	18	-	35	1	275	63	90	17
Surf scoter	180	-	-	30	35	20	30	1
White-winged scoter	5	2	40	3	130	56	140	77
Common goldeneye	37	69	51	46	102	236	285	195
Barrow's goldeneye	-	-	-	-	-	-	5	-
Bufflehead	1	22	6	33	5	8	15	57
Hooded merganser	10	39	50	46	10	48	45	89
Common merganser	-	9	1	330	21	6	98	2
Red-breasted merganser	5	116	187	50	55	197	325	134
Ruddy duck	36	285	448	685	398	1097	776	1244
Mute swan	194	225	60	32	11	54	22	15

Grassland Birds

Trustom Pond Refuge is one of the few protected places left in Rhode Island where bobolink and eastern meadowlark still nest. In 1995, the Refuge began a grasslands management program aimed at restoring up to 200 acres of former old fields, shrub lands, and crop lands to native grasslands. Both eastern meadowlark and bobolink are target species for the grassland restoration program. Upland sandpiper and grasshopper sparrow are also very desirable, but the amount of acres probably limits the ability to support breeding populations of these species. In 1997, an upland sandpiper was observed for the first time in one restored field, but we have not documented nesting. To increase nesting opportunities for grassland birds, Refuge staff developed the following objectives for the grasslands program:

- Achieve at least 90-percent coverage by native grasslands plants;
- Maintain less than 1-percent coverage by shrubs;
- Achieve a 25-percent increase in total numbers of nesting pairs of any of the following grassland nesting species: mallard, American black duck, gadwall, green-winged teal, field sparrow, eastern meadowlark, eastern bluebird, bobolink, American woodcock, and bobwhite quail.

Objectives for both vegetation and wildlife use were based on all grassland acreage over a 3-year period. Occupancy by grassland birds will depend on the maturation of the fields into suitable nesting cover.

This past year, we began to reevaluate our targeted species composition for grassland plants. Historic, early successional, native coastal sandplain habitat was likely a mosaic of young shrublands and grasslands. As we develop our Habitat Management Plan, we will continue to consider habitat patchiness and the habitat implications for bird species.

Neotropical Migrants

Since 1993, the Refuge has cooperated with the University of Rhode Island to monitor Neotropical species of interest in a red maple swamp on the Refuge, using the Monitoring Avian Productivity Station (MAPS) program. Each year during the nesting season, 10 mist nets are used for 6 hours every 10 days to catch birds. This project has demonstrated that the swamp is important nesting habitat for wood thrush, veery, northern water thrush, Canada warbler, and a variety of other Neotropical species. MAPS results are available at the Refuge Complex office.



White tailed Deer.

Mammals

A study by Paton, et al. (1998) found nine species of small mammals on the Refuge. The most abundant species was the masked shrew, followed by the short tailed shrew, red-backed vole, meadow vole, meadow jumping mouse, star-nosed vole, water shrew, and smoky shrew. Large mammals include the usual common species: deer, fox, raccoon, mink, coyote, cottontail rabbit, woodchuck, and skunk.

In March 1999, an aerial reconnaissance of approximately three-quarters of the Refuge counted 22 deer. This number was surprisingly low, since the high browse line along trails and openings indicates a much greater density, near or exceeding carrying capacity. We need additional surveys of deer population, and an evaluation of Refuge carrying capacity.

Under a partnership agreement with the Mystic Marine Aquarium, Trustom Pond Refuge has been designated the official burial site for stranded marine mammals in Rhode Island. Burial sites have all been mapped and catalogued by Mystic Aquarium for future scientific research.

Fish

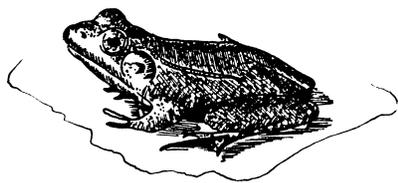
Approximately 10 species of fish currently inhabit Trustom and Card's Ponds, although relative abundance cannot be determined. It is important to recognize the ecology of fish in Trustom and Card's Ponds has changed dramatically over the years with the reduction in breaching that has occurred. The large populations of smelt, oysters, white perch, and alewife that supported a commercial industry are no longer there. Some white perch, alewife, and flounder will use Trustom Pond if breaching coincides with their runs. Other species in Trustom Pond include Atlantic silver-sides, mummichogs, sheepshead minnows, banded killifish, striped killifish, herring, mullet, and pipefish (Trustom Pond draft EA/Master Plan May 1987).

Invertebrates

Information on the availability of intertidal invertebrates is significant for shorebird management. Systematic surveys of invertebrates have been done on certain portions of Trustom Pond Refuge. A 1997 summer sample of invertebrates collected at Moonstone Beach was compared to other beaches to determine seasonal abundance of invertebrates in the intertidal zone and on the beach itself. A beach invertebrate survey was also conducted during the North Cape Oil Spill Damage Assessment (1998) and during a piping plover behavior/disturbance study (Hoopes, et al. 1989). A study to determine the presence of northeastern beach tiger beetle occurred in 1996. No northeastern tiger beetles were found, but two other species of beach tiger beetle occur on the Refuge.

Since 1993, several tick surveys have been done in the forested uplands of the Refuge to document the presence of deer ticks carrying Lyme disease. One survey showed that Trustom Pond had the second highest density of deer ticks in the state. Surveys of Trustom Pond benthos were done during the 1970's by Refuge staff. Surveys were also conducted during the North Cape Oil Spill Damage Assessment, and by the Greater Scaup Contaminants Study (Cohen 1998). Reports are on file at the Refuge Complex office.

Reptiles and Amphibians



Frog

Two studies of reptiles and amphibians on Trustom Pond Refuge have been done (Johnson 1994; Paton, et al. 1998). Johnson found 11 species of amphibians and 5 species of reptiles. Paton, et al. found 10 species of amphibian and 4 species of reptiles. Species richness results were identical in the two studies. Both are on file at the Refuge office.

The significance of the Refuge Complex for amphibians should not be underestimated. Paton, et al. (1998) states that "...the Rhode Island Refuge Complex provides critical habitat for amphibians in southern Rhode Island." These may be the only lands where these species can exist south of Route 1 due to suburbanization. Further, Chris Raithel (RI DEM) has stated that Route 1 is a complete barrier to amphibian movement, reaffirming the importance of the Refuge Complex in sustaining meta-populations of amphibians and reptiles.

An interesting result of the Paton study is that Trustom Pond Refuge has some of the largest populations of amphibians documented in Rhode Island, including four-toed salamander, spotted salamander (*Ambystoma maculatum*), and red-spotted newt (*Notophthalmus v. viridescens*).

Cultural Resources

A 1982 archaeological survey (Morenon, et al. 1983) found Trustom Pond to be of minor importance to understanding precolonial history in the area. Nine out of 19 sites examined contained evidence of prehistoric activity, but the densities were low. No sites were deemed important enough for inclusion in the National Register of Historic Places. However, areas not surveyed are considered highly sensitive for archeological deposits. Service archaeologists identified additional sites in 1996 and 1999, but neither site was investigated further, or included in the National Register.

Public Uses

Estimated public use for Trustom Pond Refuge in 1998 was 45,000 total visitor days. As stated earlier, the Refuge Complex has not established a consistent process for collecting and documenting visitation data.

Known public use activities vary seasonally, but include wildlife-dependent activities such as nature observation and photography, and environmental education and interpretation. Waterfowl and dove hunting occurs on approximately 20 acres of upland field on the eastern portion of the Refuge. About 24 percent of the Refuge (151 acres) is closed to hunting through an Audubon Society deed restriction.

Of all these activities, only environmental education, wildlife observation and interpretation, photography, and waterfowl and dove hunting formally have been determined compatible with Refuge purposes. Non-wildlife-dependent activities that now occur on the Refuge include jogging, berry picking, horseback riding, swimming, and sunbathing.

In 1994, the Refuge Manager formally determined that dog walking, jogging, swimming, and using the beach were incompatible with Refuge purposes. Except during the plover nesting season, its enforcement has been inconsistent.

Vandalism to signs, noncompliance with the piping plover beach closure, loitering in parking lots, inappropriate sexual behavior, and the threat of Lyme disease are all current issues for managing public use at Trustom Pond Refuge.

The visitor contact station was completed in 1998 through a Challenge Cost Share grant. Refuge Complex staff, volunteers, and the Friends Group designed and built the facility. It will offer a location to disseminate information to visitors, provide a base of operations for trail wardens and law enforcement staff, and provide an environmental education and interpretive site. Volunteers have staffed the visitor contact station since the summer of 1999.

School groups use the farm pond as an outdoor classroom to study pond ecology. A wooden dock with benches is available. Also, an outdoor exhibit is set up on Moonstone Beach during the plover nesting season to share information on barrier beach and dune ecology and piping plover management.

Trail System

Two trails compose the 3-mile trail system. Viewing platforms at Osprey Point and Otter Point offer wonderful opportunities to observe and photograph wildlife. Unfortunately, neither trail is completely barrier-free; a portion of one trail is ADA-accessible as far as the farm pond. We need to provide ADA accessibility on at least one trail.



American burying beetle
Christopher Raithel, RI DEM

Alternatives, Including the Service's Proposed Alternative

- Formulating Alternatives
- Features Common to all Alternatives
- Clarifying Terms or References
- Developing Land Protection Strategies
- Description of Alternatives Fully Developed
- Alternative A: No Action (Current Management)
- Alternative B: The Service's Proposed Action
- Alternative C
- Alternative D
- Alternatives or Actions Considered, but Eliminated from Further Consideration
- RONS/MMS Projects Associated with each Alternative
- Staffing Charts Associated with each Alternative
- Compatibility Determinations
- Monitoring
- Alternatives Comparison Matrix

This chapter describes and fully evaluates four alternatives spanning a reasonable range of actions for managing the Rhode Island National Wildlife Refuge Complex (Refuge Complex) and addressing the key issues identified in Chapter 1. It explains how we formulated the four alternatives, describes each one in detail, and also discusses some other management actions that we considered but did not fully develop into alternatives.

One of our primary objectives is to clearly define the differences among the alternatives. At the end of this chapter, you will find a matrix that compares and contrasts the alternatives by their specific management actions and strategies in tabular format (Table 3-2). We organized that matrix to associate actions and strategies with their function in addressing key issues.

NEPA also requires our analysis of a No Action Alternative, which can be defined or presented in one of two ways: (1) continue current management activities; or (2) take no action (literally, don't do anything). In this draft CCP/EA, Alternative A fulfills the first definition; it continues our current management activities. In the analysis that follows, we refer to Alternative A as Current Management. It provides the baseline for comparing and contrasting the other alternatives.

Formulating Alternatives

Alternatives are packages of complementary management strategies and specific actions for achieving the missions of the National Wildlife Refuge System (Refuge System) and the Service, the vision and goals of the Refuge Complex, and the purpose for establishing each refuge. Primarily, they propose different ways of supporting the goals and responding to key issues, and secondarily, different ways of dealing with the other issues, management concerns, and opportunities identified during the planning process. While those elements underlie every alternative, each is distinguished by its intensity and timing in committing the resources necessary to achieve desired future conditions.

We began developing alternatives by evaluating and addressing each key issue and relating its relationship with our stated goals for the Refuge Complex. We considered a range of management actions for resolving each key issue, from a minimum that requires little funding and staffing, to a maximum that requires considerable funding, staffing, infrastructure, and partnership development. We also considered how the strategies of each alternative would interact, whether they would be compatible with the purposes for establishing each Refuge, and the reality of accomplishing each set of projects or administrative activities during the next 15 years.

Features Common to all Alternatives

Existing Refuge Plans

All of the alternatives incorporate the completed EAs, management plans, and current step-down plans listed below. Some of the alternatives build on these documents, but do not fundamentally change their original decisions.

- 1990 Piping Plover Management (A Compatibility Determination for Trustom Pond Refuge)
- 1994 Grasslands Management Plan for Trustom Pond Refuge
- 1995 Fire Management Plan for the Refuge Complex, EA
- 1995 Animal Damage Control Plan for the Refuge Complex
- 1997 Habitat Restoration Project: Ninigret Refuge, EA
- 1998 Continuity of Operations Plan for the Refuge Complex

We need to complete the following step-down plans, which are necessary components of implementing each of the alternatives (future Service policy may require additional plans):

- Hunt Plan (update to include waterfowl on Ninigret Refuge) by 2002
- Habitat Management Plan (highest priority step down plan) by 2003
- Habitat and Species Inventory and Monitoring Plan by 2003
- Integrated Predator Management Plan by 2004
- Visitor Services Plan by 2004
- Fishing Plan by 2005
- Facilities and Sign Plan by 2005
- Cultural Resources Protection Plan by 2010
- Compatibility Determinations for Wildlife-Dependent Recreational Uses (Appendix E includes revised compatibility determinations)



Moonstone Beach, Trustom Pond Refuge. *Public use was quite high before enforcement of the seasonal closure in 1982. USFWS photo*

Two research projects previously determined compatible would remain in effect under any alternative: the Moonstone Beach Profile Study on Trustom Pond Refuge (URI); and the Lyme Disease-bearing Tick Study on Ninigret Refuge (URI). The conditions under which they were initiated have not changed; thus, they are still determined to be compatible.

Tribal Coordination

Increasing communication with the Narragansett Indian Tribal Council is common to all alternatives. They recommend developing a partnership agreement to establish a mutually beneficial working relationship that includes cooperating in environmental education and interpretation and protecting cultural resources.

Protecting and Managing Cultural Resources

By law, we must consider the effects of our actions on archeological and historic resources. Under all of the alternatives, we will comply with Section 106 of the National Historic Preservation Act before disturbing any ground. Compliance may require any or all of the following: a State Historic Preservation Records survey, literature survey, or field survey.

Refuge Revenue Sharing Payments

Annual refuge revenue sharing payments to Middletown, New Shoreham, Narragansett, South Kingstown, and Charlestown will continue under each alternative (Ch. 2, **Figure 2-1**). Future increases in payments will be commensurate with increases in the appraised fair market values of Refuge Complex lands, new acquisitions of land, and new Congressional appropriations.

Partnerships and Volunteer Opportunities

All alternatives support partnerships and volunteer opportunities to the fullest extent possible. These are vital to successfully managing the Refuge Complex. Each alternative in particular cultivates our relationship with the Friends of the National Wildlife Refuges of Rhode Island. With its mission goals so closely aligned with the goals of the Refuge Complex, the Friends of the Refuges will be indispensable in outreach, education, and project support.

Contaminant Sites Remediation

Contaminants and military debris: See Chapter 2 for a full history and description of the five sites affecting the Refuge Complex. These sites need remediation because of their obvious impacts on wildlife, habitats, human health and safety. In all of the alternatives, Refuge Complex staff would continue coordinating with the Environmental Protection Agency (EPA), Rhode Island Department of Environmental Management (RI DEM), Army Corps of Engineers (ACOE), or delegated authorities, to finalize remediation plans and begin cleaning up CERLIS sites. All of the alternatives also include a Refuge Operating Needs System (RONS) project (Appendix F) to clean up military debris on Ninigret Refuge and the farm dump site on Trustom Pond Refuge.

Adaptive Management

Common to all alternatives is a strategy of adaptive management to keep the CCP relevant and current through scientific research and management. We acknowledge that our information on species and ecosystems is incomplete, provisional, and subject to change as our knowledge base improves. The need for adaptive management is all the more compelling today.

“The earth’s ecosystems are being modified in new ways and at faster rates than at any other time in their nearly 4 billion year history. These new and rapid changes present significant challenges to our ability to predict the inherently uncertain responses and behaviors of ecosystems.” (Christensen, et al. 1996)

Objectives and strategies must be adaptable in responding to new information and spatial and temporal changes. We will continually evaluate management actions, both formally and informally, through monitoring or research to reconsider whether their original assumptions and predictions are still valid. In this way, management becomes an active process of learning what really works. It is important that the public understand and appreciate the adaptive nature of natural resource management.

The Refuge Manager is responsible for changing management actions if they do not produce the desired conditions. Significant changes may warrant additional NEPA analysis; minor changes will not, but will be documented in annual monitoring, project evaluation reports, or the Annual Refuge Narrative.

Maintaining Existing Facilities

Periodic maintenance and renovation of existing facilities is a critical need, regardless of the alternative finally selected, to ensure safety and accessibility for Refuge Complex staff and visitors. Existing facilities include the Sachuest Point Refuge visitor center, Block Island-Beane Point facility, Trustom Pond Refuge visitor contact station, Refuge Complex maintenance compound, and numerous parking areas, observation platforms, and trails. Many of these facilities are not currently Americans With Disabilities Act (ADA) compliant; upgrading is needed. Appendix F displays the fiscal year (FY) 2000 Maintenance Management System (MMS) database list of backlogged maintenance entries for the Refuge Complex. Future maintenance needs will vary among the alternatives, since they differ in the amount of new facility construction. Appendix F also identifies new construction in the project listing for each alternative.

Controlling Mosquitos

Within the past 2 years, fatalities from mosquito-borne Eastern Equine Encephalitis and West Nile virus have elevated public health concerns about mosquito control in the Middle Atlantic States. Mosquito control has been very limited on the Refuge Complex, and has occurred at the direct request of the State's Mosquito Abatement Office. During the last 5 years, we used two very localized applications of the larvicide Bti on two problem breeding sites. Our Regional Contaminants Specialist pre-approved those applications.

All of the alternatives handle this issue similarly. In general, we would not use larvicides on the Refuge Complex to control mosquitos. However, in cooperation with neighboring towns and the Mosquito Abatement Office, we would consider applying larvicides on a case-by-case basis, particularly when there is an elevated public health risk. Region 5 is now evaluating this issue in preparation for an EIS. This effort may result in Service policy or Regional guidelines being incorporated into CCPs as warranted.

Trapping

The Refuge Complex will continue its administrative trapping program for predator population management purposes only. It emphasizes reducing the threat of predators to nesting piping plover and least tern and removing animals that pose a risk to human health and safety. None of the alternatives propose a recreational or commercial trapping program.

Permitting Special Use (including Research)

Under all alternatives, requests for special use permits will be evaluated for appropriateness and compatibility on a case-by-case basis. Those requests with the potential to provide a benefit to the Refuge Complex would generally be approved, once they have been determined appropriate and compatible. To maintain the natural landscapes of the refuges, any proposals for permanent or semi-permanent structures would not be allowed, except under extenuating circumstances unforeseen at this time. Research on species of concern and their habitats will continue to be a priority. Existing, approved special use permits will continue in all alternatives. Alternatives do differ, however, in shell fishing permit requirements at Ninigret Refuge.

Additional NEPA Analysis

The National Environmental Policy Act requires a site-specific analysis of impacts for all federal actions. These impacts are to be disclosed in either an EA or Environmental Impact Statement (EIS).

Many of the actions and associated impacts that the four alternatives propose are described in enough detail to comply with NEPA, and would not require additional environmental analysis. Although this is not an all-inclusive list, the following examples fall into this category: protecting piping plover; restoring area-defined grasslands and wetlands; implementing priority wildlife-dependent public use programs (except hunting); acquiring land; and controlling invasive plants.

Other proposed actions that are not described in enough detail to comply with the site-specific analysis requirements of NEPA or Service policy require separate NEPA documents. Examples of actions that will require a separate EA include: construction of the visitor center and headquarters; new hunting opportunities; and future wetlands restoration projects that have not been fully developed or delineated in this document.

Clarifying Terms or References

Unless otherwise indicated, the Refuge Complex staff will be responsible for coordinating and implementing the management actions and strategies presented in each alternative.

We use the term “barrier free” when we are referring to structures that are ADA compliant.

The South Shore Piping Plover Restoration Project refers to the off-refuge monitoring and management of nine piping plover nesting sites along the South Shore of Rhode Island. These sites include: 1) Napatree Point, 2) Quonochontaug Beach Conservation Area, 3) East Beach - Ninigret Conservation Area, 4) East Beach - Watch Hill, 5) Green Hill Beach, 6) Charlestown Beach, 7) East Matunuk State Beach, 8) Narrow River, and 9) Scarborough Beach.

We frequently use the term “partners”. All of the alternatives involve our volunteers and the following key partners:

- Southern New England/New York Bight Coastal Ecosystems Office (FWS)
- Ecological Services, New England Field Office (FWS)
- Friends of the National Wildlife Refuges of Rhode Island
- Rhode Island Department of Environmental Management (RI DEM)
- The Nature Conservancy, Rhode Island and Block Island Offices
- University of Rhode Island, Department of Natural Resources Science (URI)
- Audubon Society of Rhode Island
- Rhode Island Coastal Resources Management Council (RI CRMC)
- Local land trusts
- Narragansett Indian Tribal Council
- Norman Bird Sanctuary
- Frosty Drew Nature Center

Developing Land Protection Strategies

Developing a land protection strategy for each alternative was one of the most time-consuming and complicated aspects of this draft CCP/EA. This effort warrants separate, detailed discussion before presenting the alternatives.

Table 3-1 associates proposed Service acquisition (in acres, by Refuge) with each Alternative. **Maps 3-1 to 3-5** show the boundaries of Level 1 and Level 2 Focus Areas. Estimated Service acquisition in Table 3-1 assumes fee title acquisition from willing sellers, although we would consider purchasing conservation easements on a case-by-case basis.

Our land acquisition policy is to obtain the minimum interest necessary to satisfy refuge objectives. Conservation easements can sometimes be more cost-effective than acquisition in fee title. In general, however, any conservation easement must preclude destruction or degradation of habitat, and allow refuge staff to adequately manage uses of the area for the benefit of wildlife. Because the purchase of development rights also must be included, the cost of purchasing conservation easements often approaches that of fee title purchase, thus rendering an easement less practical. Nevertheless, we encourage donations of easements and voluntary deed restrictions prohibiting habitat destruction.

Table 3-1. Land acquisition strategies by Alternative.

Refuge	Focus Area Level	Alternatives A & D (acres to be acquired)*	Service's Proposed Action; Alt. B**	Alternative C**
Block Island Refuge	1	(0 acres)	100 acres \$7 million	150 acres \$10 million
	2	-	-	-
Ninigret Refuge	1	(0 acres)	500 acres \$10 million	700 acres \$14 million
	2	-	-	2,400 acres \$24 million
Chafee Refuge	1	(377 acres)	1,000 acres \$20 million	3,000 acres \$60 million
	2	-	-	0 acres
Sachuest Point Refuge	1	(0 acres)	300 acres \$8 million	300 acres \$8 million
	2	-	-	1,200 acres \$45 million
Trustom Pond Refuge	1	(358 acres)	1,300 acres \$26 million	1,700 acres \$34 million
	2	-	-	2,100 acres \$21 million
Total	1	(735 acres)	3,200 acres \$71 million	5,850 acres \$126 million
	2	-	-	5,700 acres \$90 million

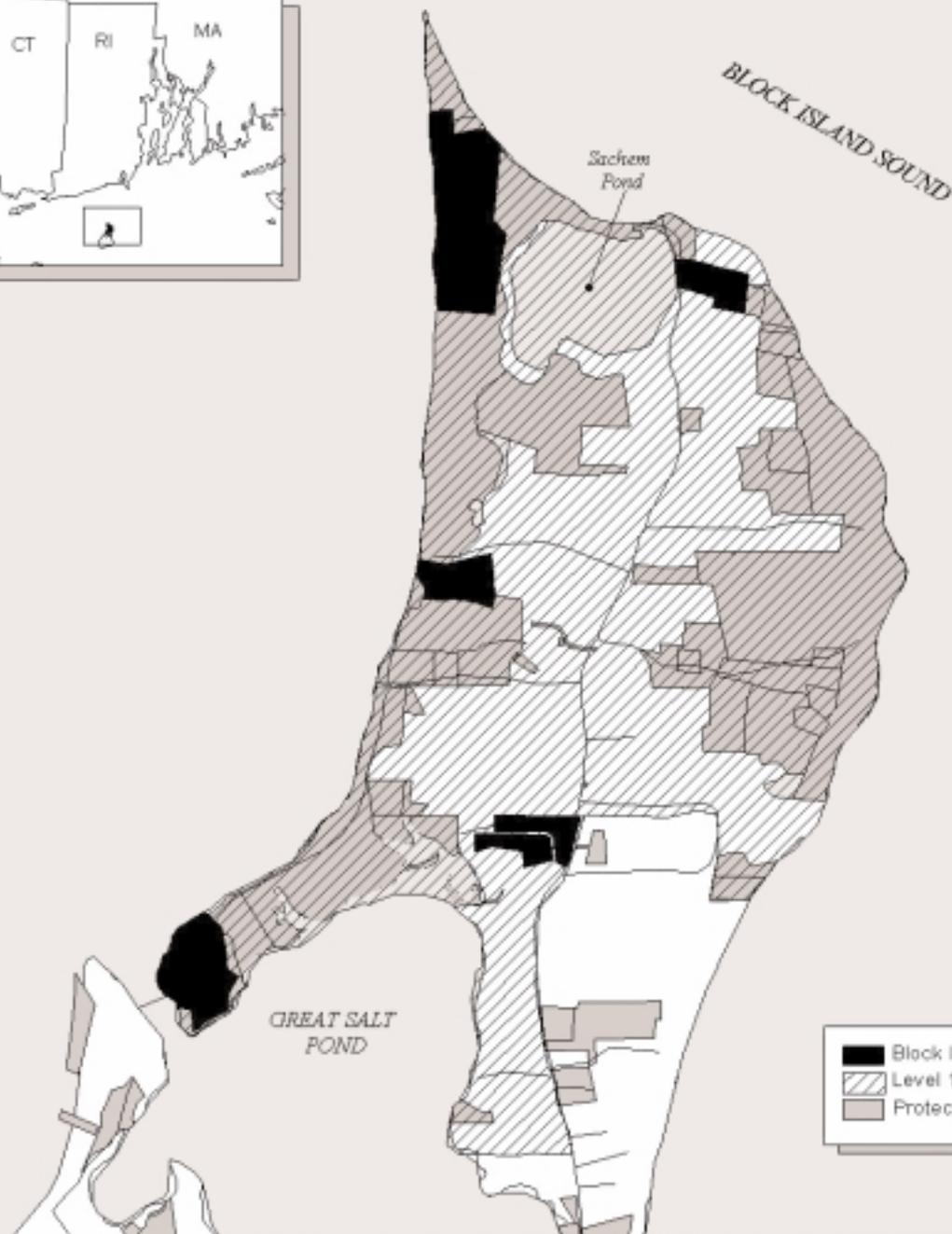
* Acres in ()'s represent those not yet acquired within the existing, approved acquisition boundaries.

** These acres and costs are inclusive of the lands not yet acquired within the existing, approved acquisition boundaries.

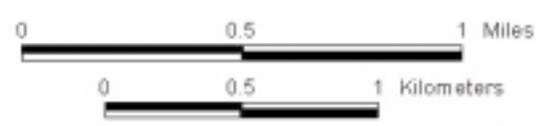
Land Protection Focus Areas

Block Island NWR Expansion

Rhode Island NWR Complex Comprehensive Conservation Plan



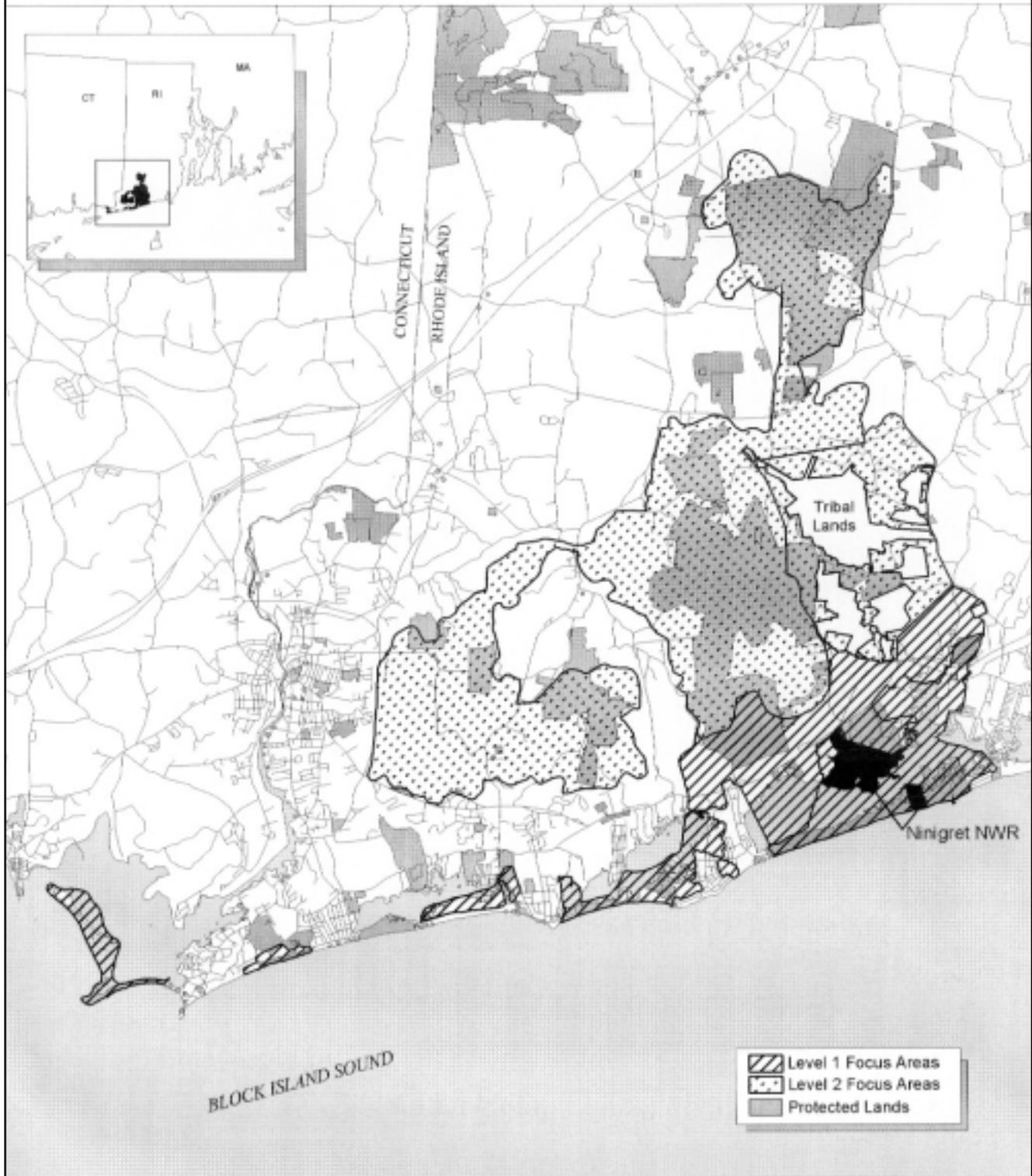
Data Sources:
 RIGIS state data (www.edc.usi.edu/rigis-spt/).
 USFWS refuge boundaries.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan.
 December 2000.
 Not to be used for legal purposes.



Land Protection Focus Areas

Ninigret NWR Expansion

Rhode Island NWR Complex Comprehensive Conservation Plan

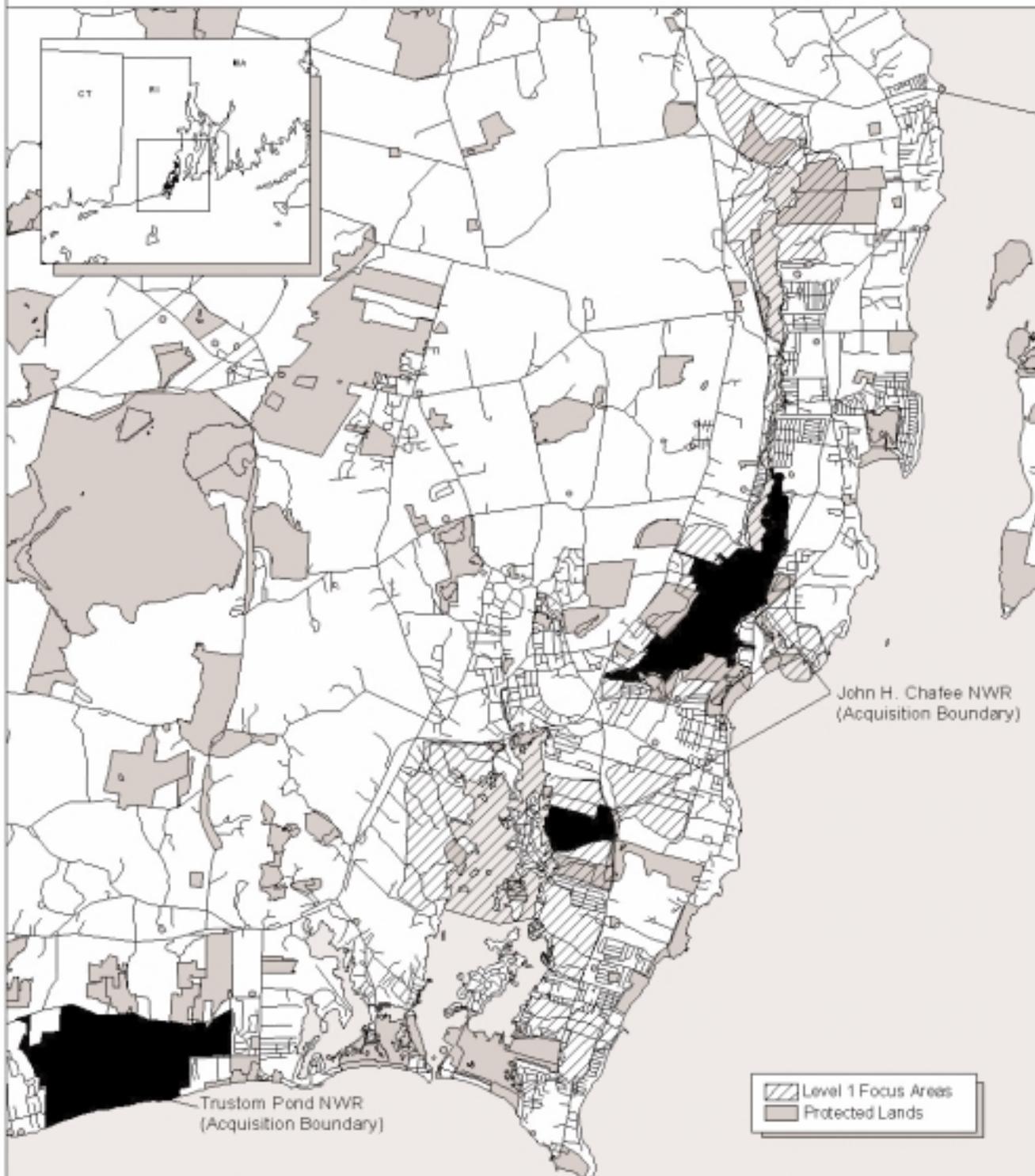


Data Sources:
RIGIS state data (www.edc.uri.edu/rigis-spf/);
ASS & focus areas created by Southern New
England/New York Right Coastal Program;
USFWS refuge boundaries.

Map prepared for Rhode Island NWR Complex
Comprehensive Conservation Plan,
December 2000.
Not to be used for legal purposes.



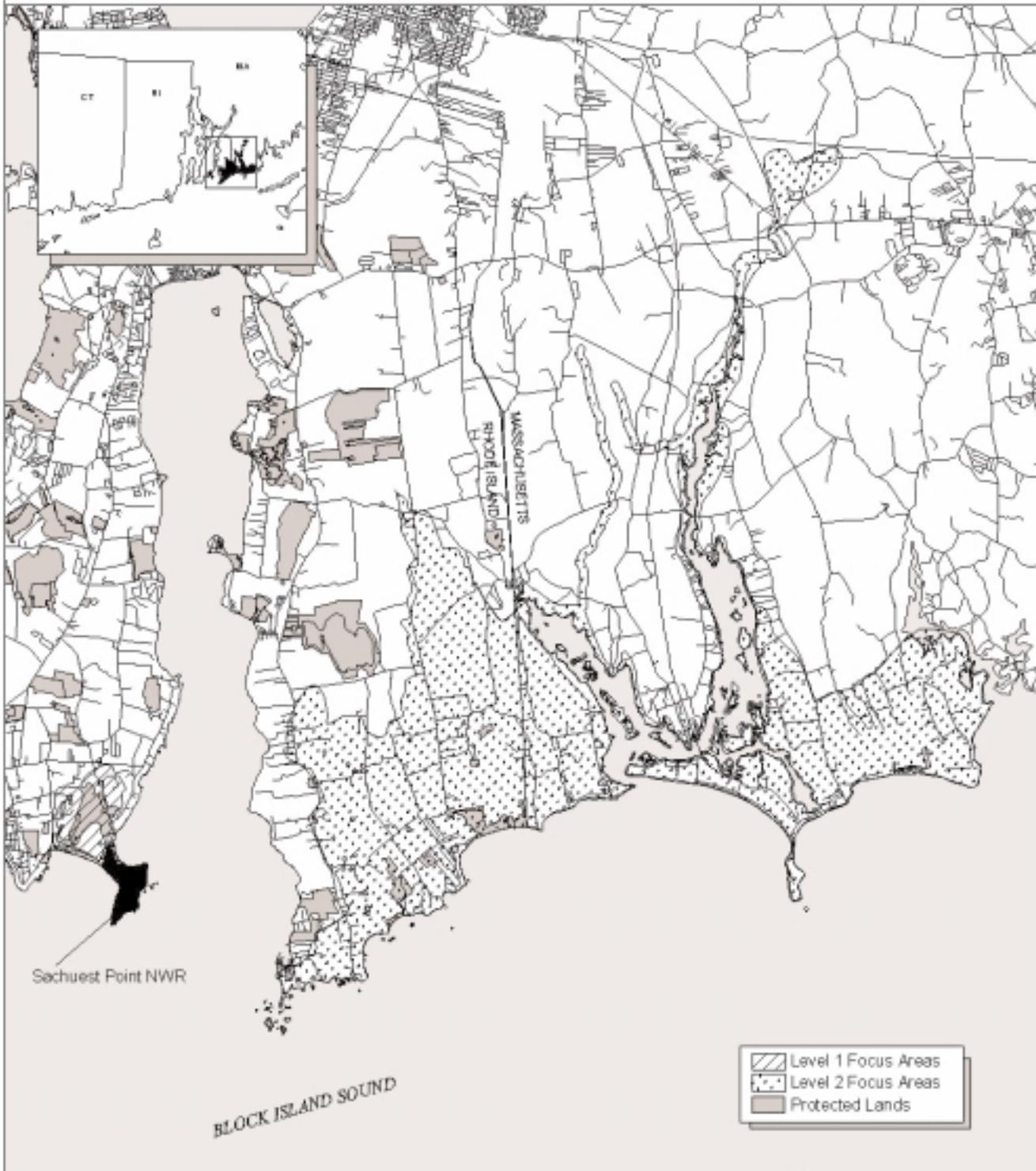
Land Protection Focus Areas
 John H. Chafee NWR Expansion
 Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 RIGIS state data (www.edi.usi.edu/rigis-ig00)
 ADI 5 focus areas created by Southern New
 England/New York Right Coastal Program.
 USFWS refuge boundaries.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan,
 December 2000.
 Not to be used for legal purposes.



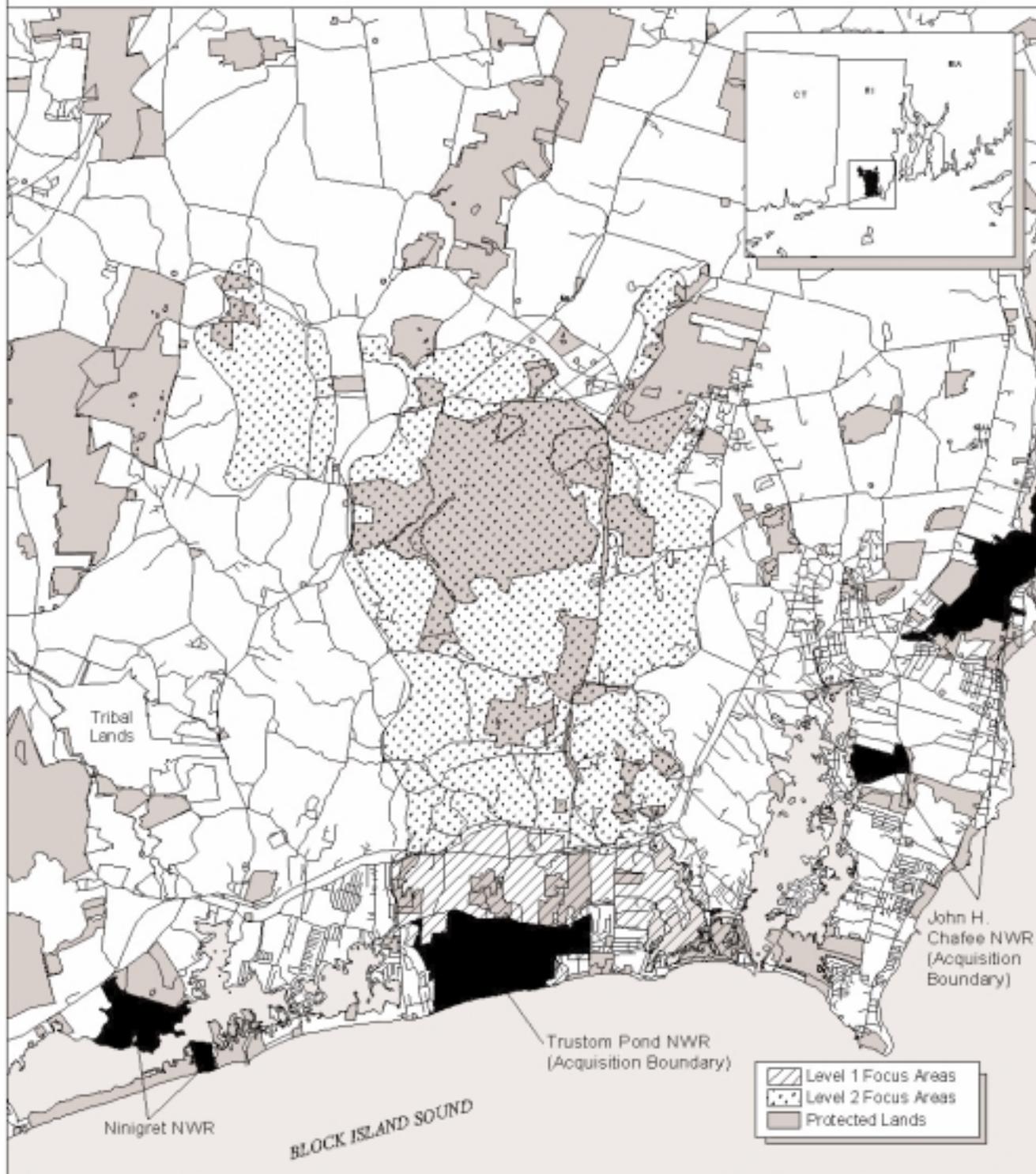
Land Protection Focus Areas Sachuest Point NWR Expansion *Rhode Island NWR Complex Comprehensive Conservation Plan*



RI GIS state data (www.edi.uri.edu/igla-0915).
 AFS & focus areas created by Southern New
 England/New York State Coastal Program.
 USFWS refuge boundaries.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan,
 December 2008.
 Not to be used for legal purposes.



Land Protection Focus Areas Trustum Pond NWR Expansion *Rhode Island NWR Complex Comprehensive Conservation Plan*



RI GIS state data (www.edi.usd.edu/ri-gis/).
 ARI & Ninigret areas created by Southern New
 England/New York Right Coastal Program.
 USFWS refuge boundaries.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan.
 December 2000.
 Not to be used for legal purposes.



In addition, the Service could negotiate management agreements with local and State agencies, accept conservation easements, and pursue cooperative partnerships or voluntary land donations, all of which would lower the estimated costs predicted in **Table 3-1**.

At the outset of our planning process in Spring 1998, we identified a study area of ecologically connected habitats in southern Rhode Island and similar, contiguous habitats in Connecticut and Massachusetts (see Ch. 1 and 2). Using the expertise of our Southern New England/New York Bight Coastal Ecosystems Program office, we determined areas of high biodiversity important to our trust resources or other rare or declining species or plant communities.



In addition to routine maintenance of Refuge facilities, Maintenance Workers Art McDonald (not shown in picture) and Jason Ringler (above) assist in habitat management. USFWS photo

First, we mapped all known occurrences of trust species, other species of management concern, their habitats, and significant natural communities (in particular, those documented as declining in the Northeast). Appendix A lists the species and plant communities of management concern on which we focused our attention. We also mapped larger ecological landscapes, typically watersheds, in which these resources reside, migrate, or are transported. Second, we consulted with conservation organizations, local land trusts, state and local governments, the Narragansett Indian Tribal Council, and the public to hear their opinions on lands in need of protection throughout southern Rhode Island.

We used all of the information above to map a two-tiered hierarchy of biologically significant lands. We called the first tier Areas of Biological Significance (ABS) and the second tier Focus Areas. Their definitions follow.

ABS – a large, contiguous area delineated by watershed or other landscape-level geographic feature, which includes areas of similar biodiversity importance, or which provides travel corridors and inter-connectivity between large, protected habitat patches. These ABS are delineated regardless of their current land protection or land use status. One ABS may contain many Focus Areas.

Focus Area – an area of particularly high biodiversity within an ABS, with documented concentrations of federally listed or globally rare species, migratory birds, anadromous fish habitat, rare plant communities, or wetlands. Focus Areas may include significant wildlife travel corridors or provide a critical link between protected lands to create contiguous, unfragmented habitat areas. Further, they include lands that would contribute to the integrity of existing refuge lands. There may be more than one Focus Area in an ABS.

We mapped five ABS, all connected with coastal ecosystems: (1) South Shore; (2) Narragansett Bay; (3) Wood-Pawcatuck Rivers; (4) Sakonnet-Westport Rivers; and (5) Block Island. (See Chapter 1, **Map 1-2** for their locations.)

We did not delineate any Focus Areas within the Narragansett Bay ABS, because RI DEM and other conservation partners have already established protection for the majority of islands, significant wetlands, and shoreline habitats in Narragansett Bay. In the Block Island Focus Area, our strong partnerships would allow the Service to influence 100 percent of this 1,440-acre Focus Area by financially investing in only 200 acres (existing and proposed Refuge land).

Our planning team evaluated each Focus Area to determine where and how the Service could have the greatest impact in protecting important resources. Our evaluation began with mapping unprotected and low density or undeveloped lands within each Focus Area. We looked at biologically significant parcels that would create opportunities for connecting large habitat areas to create contiguous, unfragmented habitat blocks. We also identified lands that would buffer and further protect the integrity of existing Refuge lands. In addition, we evaluated the current level of conservation partner involvement in these areas.

Finally, we categorized Focus Areas as Level 1 or Level 2 (**Maps 3-1 to 3-5**). Although detailed resource inventories have not been done on private lands throughout the Focus Areas, Appendix K describes the major habitat values of the ABS. The alternatives differ in the extent of Service involvement in protecting Level 1 and Level 2 Focus Areas.

The distinction between Level 1 and Level 2 reflects our recommendation on where the Service would logically be the leader in coastal land and water quality protection in southern Rhode Island, with the existing Complex refuges serving as anchors. Expanding existing refuges would significantly increase the ecological values of current refuge land, and provide an additional buffer against the impacts of land development. Continued acquisition along the South Shore and on Block Island would provide a better distribution of protected, significant coastal habitat and potential restoration habitat for migratory birds and federally listed threatened and endangered species. Further, this ecosystem approach to management provides for the dynamic fluctuations in habitat quality and quantity associated with coastal ecosystems—in particular, changes to beach strand habitats.

Implementing Alternative A (Current Management) or Alternative D would not change our current strategy of acquiring from willing sellers the 735 acres remaining within the Refuge Complex's existing acquisition boundaries. Neither Alternative A nor Alternative D uses the concept or delineation of Focus Areas.

Under Alternative B (our Proposed Action), the Service would take a lead role in protecting Level 1 Focus Areas, with particular emphasis on Service acquisition of unprotected, undeveloped parcels. Our methods would include fee title acquisition from willing sellers only, conservation easements, and cooperative management agreements with interested landowners. The overall objective would be to assemble biologically significant, administratively effective management units that enhance and contribute to sustaining the existing Refuge Complex and the federal trust resources over the long term.

Where the conservation efforts of our partners is consistent with the Mission of the Refuge System, we would provide technical or resource support, outreach, and education. Under Alternative B, we would generally not acquire land in Level 2 Focus Areas in fee title.

In implementing Alternative B, we would acquire an additional 3,200 acres at an estimated cost of \$71 million. Those 3,200 acres would include the 735 un-acquired acres within current Refuge Complex boundaries, as well as acreage within the Level 1 Focus Areas. Our priorities for land acquisition within Level 1 Focus Areas would be based on the following criteria (in order of priority):

1. Has documented occurrence of federally listed threatened or endangered species or other federal trust resource;
2. Lies contiguous to existing refuge land, which could further enhance or protect the integrity of these areas by assembling the land base necessary to accomplish refuge goals;
3. Connects refuge land with other protected lands within the South Shore and Block Island Focus Areas to help restore and promote the ecological integrity of the coastal wetland and beach strand complexes of the refuge; or
4. Protects and sustains important natural communities that can be managed in cooperation with other land management conservation partners in a manner that will contribute toward refuge goals for our federal trust resources.

Alternative C would notably increase the acres of Service acquisition, particularly in Level 2 Focus Areas. We would consider acquiring land in fee title or purchasing conservation easements when our conservation partners did not have the resources or funds to adequately protect habitat important to federal trust species. Alternative C also identifies Level 2 land acquisition to provide the Service with the flexibility to acquire land in these areas should significant habitats come under threat, or a manageable tract of land important to trust resources become available.

Under Alternative C, the Service would acquire 11,550 acres at an estimated cost of \$216 million. This increased amount stems from acquiring more undeveloped, unprotected land within Level 1 Focus Areas, and enhancing conservation ownership and protection in Level 2 Focus Areas. The criteria to establish priorities for acquisition within Focus Areas would be the same as in Alternative B, above.

A more detailed land acquisition plan, identifying specific tracts proposed for acquisition, will be prepared with the final CCP/EA. This detailed land acquisition plan must be reviewed and approved by the Director before implementation. The Director's approval would authorize the Service to acquire lands within each Focus Area up to the number of acres each identified. Lands would be acquired under the authority of the Emergency Wetlands Restoration Act of 1986, the Migratory Bird Treaty Act of 1918 as amended, or the following three acts, which allow acquisition using Land and Water Conservation Fund money: The Endangered Species Act of 1973 as amended, the Fish and Wildlife Act of 1956, and the Refuge Recreation Act of 1962 as amended.

At this time, none of the alternatives propose establishing a new national wildlife refuge in Rhode Island. However, nothing in this EA precludes designating a new refuge in the future, should conditions warrant.

Description of Alternatives Fully Developed

The four alternatives developed in detail are presented below. After a brief narrative description of each alternative, we provide a list, by Refuge, of the management strategies and actions designed to support our goals and address the key issues identified in Chapter 1. Maps depicting habitat management and public use actions follow each alternative discussion. Alternative A (Current Management) actions are presented in their entirety; the other alternatives are presented relative to their respective differences from Alternative A.

Following these descriptions, Table 3-2 provides a side by side comparison of how the alternatives address the key issues. The principal federal actions and strategies for each alternative are highlighted in this table. Table 3-2 is designed to give the reader a quick overview of the actions that distinguish alternatives and their relationship to the key issues. The environmental consequences of implementing all the proposed actions is described in detail in Chapter 4.

Alternative A: No Action (Current Management)

This alternative describes current management activities and serves as the baseline against which all other alternatives are compared. Projects planned, funded, and/or underway are described in this alternative, including site selection criteria for the new Refuge Complex Headquarters/Visitor Center, funded by the 1997 Transportation Equity Act for the 21st Century. The species and habitat management priorities would continue to be piping plover nest site protection and early successional grasslands and shrublands restoration. The current public use programs, which emphasize wildlife observation, environmental education and interpretation, would be maintained across the Refuge Complex. No significant increases over what is currently planned would occur in any of these program areas. Permanent staffing would continue at 10 full-time equivalents (FTEs).

Intensive management of active piping plover nest sites would continue as a priority on the Refuge Complex. In addition, Refuge staff would continue to be involved in managing the other nine active South Shore piping plover sites. A second habitat priority would be to continue the 345 acres of grassland restoration work between Ninigret and Trustom Pond Refuges.

We estimate a 10% increase in Refuge Complex visitation associated with the Visitor Center/Headquarters currently being planned for 2003. This is based on 1999 RI DEM statistics showing a similar increase in visitation to state park and beach visitor facilities compared to previous years. Increases in visitation on individual Refuges are not a targeted objective of this alternative. However, a few currently planned projects which strive to improve the quality of existing programs would likely increase visitation (e.g. "Trail through Time" project at Ninigret Refuge, staffed visitor contact facility at Trustom Pond Refuge).

Across the Refuge Complex, fishing and hunting opportunities would not change; the only hunting opportunity is on a 20 acre upland field on Trustom Pond Refuge. All Refuges would remain open to fishing; Chafee Refuge, in fact, would only be open to fishing and would remain closed to all other public uses. Limited outreach, education, and enforcement addressing nonwildlife-dependent public uses would continue. Service presence on both Chafee and Block Island Refuges would continue to be limited.

Acquisition of 735 acres would continue within the approved Refuge acquisition boundaries, as funding and willing sellers allow. Existing partnerships would be maintained, including the Memorandum of Understanding (MOU) with the Friends of the National Wildlife Refuges of Rhode Island and the Memorandum of Agreement (MOA) with Frosty Drew Nature Center. Involvement by volunteers would continue on Ninigret, Sachuest Point, and Trustom Pond Refuges.

Chapter 2 provides details on the existing social, physical, and biological settings of the Rhode Island Refuge Complex, and includes a description of the management actions currently implemented on each Refuge. Chapter 4 describes the environmental consequences of maintaining the current programs.

Issue 1: Protection of endangered and threatened species and other species and habitats of special concern

How will piping plover nesting sites be protected at Trustom Pond Refuge?

On Trustom Pond's Moonstone Beach our primary objective has been to protect all active piping plover nesting sites from direct impacts and to increase productivity and fledging rates to meet the recovery goal of an average 1.5 fledged chicks/pair. In particular we have been focused on:

1. Protecting all known piping plover nest sites on Moonstone Beach from physical destruction;
2. Minimizing disturbance to adults and chicks from humans, pets, and predators; and
3. Minimizing direct loss of adults, chicks, and eggs from predators.

Alternative A would continue to implement "Piping Plover Management for 1990: A Compatibility Determination at Trustom Pond National Wildlife Refuge." These actions exceed the 1994 Service guidelines for managing plover beaches. Specific actions include:

- Each year, continue to install symbolic fencing along the entire length of beach to exclude public access above mean high tide from April 1 to Sept. 15 (symbolic fencing is described in Chapter 2, under the Block Island Refuge description).
- Continue to exclude vehicles from the beach year-round.
- Install protective fencing (predator exclosures) around immediate nest sites, as they are located.
- Continue to hire up to 3 seasonal employees to monitor piping plover and least tern nest sites and manage public use.

How will piping plover nesting sites be protected at Ninigret Refuge barrier beach and on other active sites throughout the South Shore of Rhode Island?

The Ninigret Refuge piping plover nesting area extends beyond the Refuge and includes the adjacent state-administered Ninigret Conservation Area. Nine other active or potential piping plover nesting sites occur on Rhode Island's South Shore, off refuge lands, and are monitored as a cooperative venture between the Refuge and the landowner. As with Trustom Pond Refuge, our primary objective has been to protect all active piping plover nesting sites from direct impacts and to increase productivity and fledging rates to meet the recovery goal of an average 1.5 fledged chicks/pair. On Ninigret Refuge, we exceed the 1994 Service guidelines; off-Refuge, we are striving to meet them.

- Each year, we would continue to monitor piping plover and habitat beginning in early April and install symbolic fencing around potential territories (above mean high tide line) to exclude public access. Fencing would remain in place until birds have fledged (typically by August 15). Predator fence exclosures would be placed around immediate nest sites.
- Each year, we and the Friends Group would continue to install informational signs and interpretive displays at seven nesting beach locations (six of these are off-Refuge) and continue to monitor nine potential nesting sites along the South Shore of RI.
- We would continue to support RI DEM's seasonal (April 1 - Sept 15) vehicle closure on Ninigret Conservation Area's beach.
- Each year, we would continue annual coordination with the Friends Group to provide oversight, conduct public outreach and education, and help secure non-Service funding for the South Shore Piping Plover Program.

How will piping plover nesting sites be protected in the Block Island Focus Area?

Under current management, our objective is to meet the 1994 Service guidelines for managing piping plover beaches.

- Each year, by April 1 we would install posts or symbolic fencing around suitable nesting habitat on the Refuge to restrict public access. Also by April 1, we would monitor potential nesting sites at least twice each week, switching to three times each week after May 1. If an actual nest is located, nest exclosures would be erected, and vehicles would be restricted from the entire beach, just prior to chick hatching. We would continue to work with the Town of New Shoreham to exclude public use in active nesting territories on town beaches.

How will piping plover predators be managed on Rhode Island Refuge Complex nesting sites?

- Refuge staff would continue to implement the 1995 Animal Control Plan, which allows for both lethal and non-lethal control methods, as necessary. Trapping would continue to occur by a licensed state trapper or Refuge staff immediately before and briefly into the plover nesting season at both Ninigret and Trustom Pond Refuges.

How can piping plover habitat be improved at Trustom Pond Refuge?

- We are not planning any habitat improvements associated with piping plover management.
- We would continue to breach Cards Pond, at the request of adjacent landowners, and breach Trustom Pond once a year in early spring. Breaching of the ponds temporarily creates exposed mud flats on which the chicks and adults may feed.

How will the Service coordinate with other agencies and private landowners to protect potential piping plover sites throughout the South Shore of Rhode Island?

- We would continue to attend the annual meeting with piping plover recovery cooperators and continue efforts on the nine sites off-refuge.

How will the Refuge Complex increase public awareness of piping plover issues through outreach and education?

- Continue to maintain two interpretive panels on Refuge beaches (and a mock nest enclosure explaining its design and purpose) and install informational signs restricting public use.
- Continue to develop a barrier beach education kit for teachers.
- Continue coordination with the Friends Group and use of seasonal biological technicians and volunteers to meet and educate beach visitors.

How will the Refuge Complex ensure that piping plover management practices are based on sound science?

- We would continue to consult on three studies occurring on active South Shore nest sites, including a Misquamicut Beach predator study and a Napatree Point public use study.

How will the Refuge Complex contribute to the protection and restoration of the American burying beetle population within the Block Island Focus Area?

- There is currently no special management emphasis on American burying beetle populations.
- We would continue mowing the small grassland area around the house at Beane Point, which is where beetles were previously observed.

How will the Refuge Complex protect bald eagle habitat within the Block Island Focus Area?

- There is currently no special management emphasis on bald eagle. The Nature Conservancy periodically monitors roosting individuals on Block Island.

How will the Refuge Complex contribute to establishing populations of northeastern beach tiger beetles within the South Shore Area of Rhode Island?

- There is currently no management emphasis on northeastern beach tiger beetles.

How will the Refuge manage habitat to benefit black duck at Chafee and Trustom Pond Refuges?

- There is currently no special emphasis on black duck at either Refuge; although there are actions that indirectly benefit black duck and their habitat.
- We would continue the hunting closure on Chafee Refuge on Refuge lands above the mean high tide line*, as well as the hunting closure on Trustom Salt Pond, since both areas provide resting habitat for black duck.

* It is important to note that the Service has jurisdiction only over lands above mean high tide line, and does not have jurisdiction or authority over state-owned, navigable waters.

- A limited Phragmites control program would continue, using chemical and mechanical treatments, as funding and personnel support allows. We would also continue adding eggs for mute swan control on Trustom Salt Pond. Both of these species negatively impact the quality of black duck habitat.

How will the Refuge protect wintering harlequin duck at Sachuest Point Refuge?

- There is currently no special management emphasis on harlequin duck. Volunteers would continue weekly counts of harlequin and other wintering sea ducks between September and April each year. The Refuge is not open to hunting.

How will we manage waterfowl concentration areas on the Refuge Complex?

- We would continue habitat improvement work related to Phragmites control on Trustom Pond and Ninigret Refuges, and continue with the 15-acre wetland restoration project at Sachuest Point.
- Each year we would continue to addle mute swan eggs on Trustom Pond. In addition, we would continue to breach Cards Pond at the request of adjacent landowners, and Trustom Pond once each spring.

How will we protect important marsh and wading bird habitat areas on the Refuge Complex?

- There is currently no special emphasis for these species. Each year, The Nature Conservancy and RI DEM would continue to monitor the Block Island Refuge heron/egret rookery; the only known rookery on the Refuge Complex.

How will least tern nesting sites be protected on the Rhode Island Refuge Complex?

- Each year, we would continue to place a wire fence around the colony on Moonstone Beach, Trustom Pond Refuge, for predator control. We would continue least tern surveys in conjunction with annual piping plover surveys.

How will the Service protect and improve feeding and staging shorebird concentration areas along the South Shore of Rhode Island and on Block Island?

- There is currently no management emphasis. Incidental protection is afforded through piping plover management and land acquisition programs.
- We would continue to annually survey shorebirds on Sachuest Point Refuge in the winter and submit the information on the International Shorebird Survey forms coordinated by Manomet Bird Observatory.

How will the Refuge Complex protect and manage other landbirds of management concern on the Rhode Island Refuge Complex?

- We would continue annual bird monitoring associated with the grassland restoration work at Ninigret and Trustom Pond Refuges. These occur bi-weekly during May and June of each year.
- We would also continue coordination with the University of RI to conduct the Monitoring Avian Productivity and Survivorship (MAPS) project.
- In addition, we would continue to conduct Refuge wide Breeding Bird Surveys on a 3- to 5- year interval, occurring biweekly during the breeding season.

How will the Refuge Complex protect seal haul-out areas on Refuge lands?

- There is currently no management emphasis on seal haul-out areas. Sachuest Point and Block Island Refuges have the only known, consistently used seal haul-out areas on the Refuge Complex.

How will the Refuge Complex improve anadromous fish habitat in Pettaquamscutt Cove (Narrow River), Trustom Pond, and the Wood-Pawcatuck Rivers?

- There is currently no management emphasis on anadromous fish habitat.

How will the Refuge Complex protect amphibian and reptile populations and habitats on the Refuge Complex?

- There is currently no management emphasis on amphibian or reptile populations. The University of RI has recently conducted amphibian surveys at Trustom Pond and Ninigret Refuges.

How will Refuge staff protect and manage rare plant habitats on the Rhode Island Refuge Complex?

- We would continue coordination with the University of RI to monitor and map existing rare plant sites at Ninigret Refuge. We would continue with plans to complete the trail relocation project at Ninigret Refuge which will steer public use away from the sensitive plant sites.

Issue 2: Restoration and maintenance of coastal sandplain natural communities, including grasslands

Early successional, native coastal sandplain communities are in dramatic decline throughout New England, especially the native grasslands. Many coastal grassland dependent species are suffering significant population declines as a result, to the point they are being considered for state and/or federal listing. The Rhode Island Refuges provide a unique opportunity to manage early successional coastal sandplain grasslands and shrublands and contribute to the protection of species associated with these vegetative communities.

Where will Refuge staff restore grassland communities on the Rhode Island Refuge Complex?

- We would continue managing a total of 220 contiguous acres at Ninigret Refuge to maintain or restore the biological diversity and the natural physical components associated with early successional, coastal sandplain grasslands and shrublands. Actions would include converting 70 acres of asphalt runway to native coastal sandplain grasslands and maintaining 150-acres of early successional, native coastal shrublands.
- The 70 acres of asphalt runway would be restored to sandplain grasslands as outlined in the 1997 Environmental Assessment: Habitat Restoration Project, Ninigret National Wildlife Refuge. Once completed, the restored former runway areas would be dominated by native species, in the following approximate proportions: little bluestem (75%), big bluestem (10%), Indiangrass (5%), and switchgrass (10%). Work is being accomplished gradually, given limits in funding, staffing, and the availability of Army and Navy Reserve Units to help remove the asphalt from the runways.
- We would also continue to manage the 125-acre early successional shrub and grassland restoration project on Trustom Pond Refuge and 42 acres of early successional shrub and grassland habitat, including intensive invasive plant control, on Sachuest Point Refuge. This work is conducted as current funding and staffing levels have allowed. As outlined in the 1995 Trustom Pond Refuge Grassland Management Plan, the work on Trustom Pond Refuge is restoring former pasture and croplands to a little bluestem dominated grasslands similar to Ninigret Refuge, or using a sculpted seeding method, using big bluestem, Indiangrass, and switchgrass depending on soils, topography, and hydrology in areas where little bluestem does not establish.



Big bluestem. *USFWS photo*

How will grassland restoration be implemented on the Rhode Island Refuge Complex?

- We would continue to implement the strategies in the 1995 Trustom Pond Refuge and 1997 Ninigret Refuge Grassland Management Plans, which include use of mechanical manipulation (primarily brushhogging or hydroaxing woody vegetation, and discing, harrowing, plowing, packing, and drilling grassland fields), prescribed fire, biological controls, and chemical herbicide treatments. All prescribed fires would adhere to stipulations in the 1995 Fire EA. All herbicides used are on an approved Service list, and their use on the Refuge is approved annually by the Regional Environmental Contaminants Specialist. These same treatments would continue to be utilized in the early successional habitat work on Sachuest Point Refuge.

How will the Refuge Complex promote grassland restoration on private lands?

- We would continue with the private land cooperative grassland habitat work on 40 acres adjacent to Trustom Pond Refuge. Herbicide treatments, fertilizing, mowing, and some reseeding with a big bluestem dominated mixture would occur for maintenance. These acres enhance the restoration work on the Refuge by creating a larger complex of grasslands for those grassland dependent species that require larger contiguous grasslands. In addition, we would maintain the grassland restoration interpretive sign at Ninigret Refuge trailhead as an outreach tool.

Issue 3: Management of the beach strand ecological community

How will Refuge staff protect and restore beach strand communities?

- We would continue to acquire beach strand habitat within approved acquisition boundaries from willing sellers as funding allows. Our highest acquisition priority will remain beach strand habitat proximal to other undeveloped areas, whose size and condition permits us to maintain or restore their biological integrity.
- The Refuge Manager would also continue to serve as Oil Spill Field Response Coordinator for the U.S. Coast Guard's Captain-of-the-Port, Providence Area.

Issue 4: Management of Trustom Salt Pond

How should Trustom and Cards Ponds be managed to improve water quality and benefit species of concern?

- We would continue to breach Trustom Pond once a year to improve water quality and breach Cards Pond at the request of landowners. Land acquisition from willing sellers within the Trustom Pond Refuge acquisition boundary would continue, as funding allows.

Issue 5: Protection and restoration of wetlands

How will Refuge staff restore and promote wetland ecosystems on the Rhode Island Refuge Complex?

- We would continue to work with USGS Biological Resources Division to monitor 15 acres of recently restored tidal salt marsh on Sachuest Point Refuge. That restoration realigned a culvert to restore tidal flow to a creek and mechanically scarified Phragmites.
- We would continue to coordinate with the ACOE, who have begun a feasibility study on restoring natural hydrology to an additional 25 acres of Phragmites-dominated marsh at Sachuest Point Refuge.
- We would continue to cooperate with the EPA or its delegated authority, in restoring the CERCLIS site at Sachuest Point Refuge (the former Middletown landfill).
- Current management does not emphasize restoring any other wetlands, other than controlling less than 5 acres per year of Phragmites on Trustom Pond Refuge and Ninigret Refuge by mowing, burning, and applying the herbicide Rodeo, annually approved by the Regional Contaminants Specialist.

Issue 6: Improving water quality in the Narrow River

How will Refuge staff contribute to improving and protecting the water quality of Petaquamscutt Cove and the Narrow River Watershed?

- There is currently no management emphasis on protecting water quality. Protection of water quality is one of the desired results of our land acquisition efforts in this watershed. We would continue land acquisition from willing sellers within the approved acquisition boundary for Chafee Refuge.

Issue 7: Control of invasive, non-native, or overabundant plant and wildlife species

How will Refuge staff control non-native and/or invasive plant species on the Refuge Complex?

- We would continue limited Phragmites control at Trustom Pond Refuge, as funding and personnel allow. Over the last 5 years, a total of 5 acres of Phragmites has been treated at Trustom Pond Refuge.
- Chemical, fire and mechanical treatments would continue to be used with the limited control efforts targeting Phragmites, autumn olive, Japanese honeysuckle, and Asian bittersweet across the Refuge Complex.
- We would continue to annually monitor the biological control test site where beetles were released to control purple loosestrife on Sachuest Point Refuge.

How will Refuge staff manage non-native, invasive mute swan on the Rhode Island Refuge Complex to reduce adverse effects on waterfowl and water quality?

- We would continue annual efforts with RI DEM to addle mute swan eggs on Trustom Pond with an objective of zero productivity.

How will Refuge staff manage deer populations within and adjacent to the Rhode Island Refuge Complex?

- There is no current management for deer. Browsing at Ninigret and Trustom Pond Refuges indicates an overabundant population; however, deer populations have not been monitored. The incidence of Lyme-disease-bearing deer ticks continues at high levels on the refuges.

Issue 8: New Refuge Complex land acquisition and cooperative protection of sensitive habitat sites

How will the Service's land acquisition program be expanded to protect species and habitats of special concern?

- We would continue to acquire land from willing sellers within the approved individual Refuge acquisition boundaries, as funding allows. The remaining acreage to be acquired within approved acquisition boundaries is 735 acres. Additional details are provided in **Table 3-1** and in the "Land Protection Alternative Development" section earlier in this chapter.
- Working with partners to identify and protect important habitat areas would continue to be extremely valuable to resource protection in Rhode Island. We would continue to consult with local land trusts, The Nature Conservancy, Audubon Society, RI DEM, and respective town planners and conservation commissions to identify important habitat areas.

Issue 9: Access to credible resource information on the Refuge Complex to ensure management decisions are based on the best available science

How will Refuge staff establish needs for and begin to collect baseline biological information across the Rhode Island Refuge Complex?

- We would continue with the annual Breeding Bird Survey and would maintain the Monitoring Avian Productivity and Survivorship station as a cooperative effort with University of RI. Continued research collaboration with University of RI is yielding studies on Neotropical migrants, amphibians and reptiles, deer, and rare plants.
- We would continue other monitoring and inventory work related to piping plover and least tern, wintering waterfowl, biological control agents on invasive plants, and the grassland restoration projects. Some of this information is available in a digital format, but most is not. Not all information collected to date follows Regional Service protocols for habitat inventory and monitoring.

How will Refuge staff insure that the biological integrity of natural communities will be maintained on the Rhode Island Refuge Complex?

- Currently, no special management actions address this question except our recent consultations with plant ecologists as we work to define the desired future character and distribution of coastal sandplain and maritime plant communities.

Issue 10: Management of public use and access (except hunting and environmental education which are discussed as separate issues)

The Refuge Complex lacks a strategic plan for visitor services. Public use management has emphasized programs for wildlife observation, and environmental education and interpretation. The overall objective of Alternative A is to improve the quality of existing programs.

How will we improve visitor services?

- We would continue public use projects currently scheduled to benefit visitor services, including the 3.8-mile Trail through Time, staffing the visitor contact facility on Trustom Pond, renovating the Sachuest Point visitor facility, and completing the plans for the Complex visitor center and headquarters.

How will we improve our existing partnerships for public use on the Refuge Complex?

- We would continue to meet annually with the Friends of the Refuges under our current MOU, and maintain our MOA with Frosty Drew Nature Center.
- Our informal cooperation with the South County Museum, Narragansett Indian Tribal Council, Norman Bird Sanctuary, South County Tourism Council, and local chambers of commerce would also continue.

What fishing opportunities will be available at Block Island Refuge?

- We would continue to allow surf fishing in accordance with State regulations from the Refuge shoreline. Off-road vehicle (ORV) use that occurs in conjunction with surf fishing is generally not restricted, except travel must occur outside of posted piping plover areas. However, if piping plover actively nest, vehicles would be restricted from the beach from when chicks hatch to 35 days of age.

What fishing opportunities will be available at Ninigret Refuge?

- Surf fishing would continue on the barrier beach, but vehicles would be restricted above mean high tide where the Service has jurisdiction. We would continue to support RI DEM's annual vehicle closure of the adjacent Ninigret Conservation Area beach from April 1 to Sept. 15. Other access restrictions may be imposed if nesting plovers are found. We would continue recreational fishing and recreational and commercial shell fishing in Ninigret Pond, under State and Refuge regulations, with access by foot only across the Refuge to the pond.

What fishing opportunities will be available at Chafee Refuge?

- Saltwater fishing would continue in accordance with State regulations. Current management provides no designated trail access.

What fishing opportunities will be available at Sachuest Point Refuge?

- Surf fishing, including night fishing, would continue from Refuge shorelines on the Atlantic Ocean and Sakonnet River, under State regulations.

What fishing opportunities will be available at Trustom Pond Refuge?

- Surf fishing from Refuge shorelines on the Atlantic Ocean would continue from September 16 to March 31, in accordance with State regulations. This open season falls outside the piping plover nesting season and shorebird migrating season (April 1 to September 15). No vehicles are allowed on the beach year-round.
- Trustom Pond itself is closed to fishing year-round to maintain its highest and best use as a wildlife sanctuary.

What kind of interpretive opportunities will be available at Block Island Refuge?

- The Nature Conservancy would continue its interpretive programs on the Refuge. The Refuge has no interpretive signs.

What kind of interpretive opportunities will be available at Ninigret Refuge?

- We would continue to maintain its two kiosks. We would continue to participate in local, Chamber of Commerce-sponsored events, and continue to use volunteers to lead interpretive programs.

What interpretive opportunities will be available at Chafee Refuge?

- Current management provides no interpretive program.

What kind of interpretive opportunities will be available at Sachuest Point Refuge?

- We would continue to maintain the kiosk on the Refuge, and use volunteers to staff the visitor center and conduct interpretive programs. We would improve the visitor center and its exhibits as funding allows.

What kind of interpretive opportunities will be available at Trustom Pond Refuge?

- We would continue to maintain the two existing kiosks. Volunteers would continue to staff the visitor contact station and conduct interpretive programs.

What kind of wildlife observation and photography opportunities will be available at Block Island Refuge?

- No infrastructure is in place for wildlife observation or photography; the Refuge has not been opened to these activities. We would continue to maintain the Refuge as undeveloped until the Service acquires enough appropriate land for development and infrastructure. We would also continue to restrict public use in areas where piping plover are observed showing territorial behavior.

What kind of wildlife observation and photography opportunities will be available at Ninigret Refuge?

- We would maintain the existing platform at Grassy Point, and continue construction of the 3.8-mile, barrier-free Trail Through Time as funding and current staffing allow. This would reduce the current trail system from approximately 8.0 miles.

What kind of wildlife observation and photography opportunities will be available at Chafee Refuge?

- Current management offers no opportunities for wildlife observation, except from public roads. We would continue to maintain Chafee Refuge as undeveloped until the Service acquires enough appropriate land for development and infrastructure.

What kind of wildlife observation and photography opportunities will be available at Sachuest Point Refuge?

- We would maintain the existing 3-mile trail network and viewing platform, with unrestricted access to the shoreline.

What kind of wildlife observation and photography opportunities will be available at Trustom Pond Refuge?

- We would maintain the current two-trail system with one trail head and kiosk. We would also maintain the three observation platforms, two of which are on Trustom Pond.

How will we manage nonwildlife-dependent activities at Block Island Refuge?

- Enforcement of nonwildlife-dependent activities is virtually non-existent. Primary nonwildlife-dependent uses of concern are using off-road vehicles (ORVs), dog walking, swimming and sunbathing, jogging, and kite flying.

How will nonwildlife-dependent activities be managed at Ninigret Refuge?

- The current staff conducts limited law enforcement against nonwildlife-dependent activities, primarily bike riding, roller blading, dog walking, jogging, kite flying, using ORVs, swimming, and sunbathing.
- Walking dogs on leash and bicycling have previously been allowed on runways under a decision in 1997 (Habitat Restoration Project EA: Ninigret Refuge) that these uses would be eliminated once the runways had been removed.

How will nonwildlife-dependent activities be managed at Chafee Refuge?

- The Refuge is currently closed to all activities except fishing, with very limited enforcement of prohibitions on nonwildlife-dependent activities. The primary nonwildlife-dependent use is unauthorized access across the Refuge using unmaintained, non-designated trails.

How will nonwildlife-dependent activities be managed at Sachuest Point Refuge?

- Limited enforcement of nonwildlife-dependent uses would continue, as staffing and budgets allow. Primary nonwildlife-dependent uses at the Refuge are jogging, dog walking, swimming, sunbathing, bicycling, horseback riding, and setting bonfires.

How will nonwildlife-dependent activities be managed at Trustom Pond Refuge?

- Law enforcement would continue to focus on keeping people and dogs out of the Moonstone Beach piping plover closure area, and on enforcing against inappropriate behavior on beaches, parking areas, and trails. Other primary nonwildlife-dependent uses of concern are swimming and sunbathing, bike riding, horseback riding, using ORVs, and flying kites.

What priority public uses would be allowed on newly acquired Refuge lands?

- At the time of acquisition, the Refuge Manager evaluates existing public uses of the tract. Those determined to be compatible are allowed to continue. If no public uses have been established, the new tract remains closed to public use until a formal compatibility determination has been completed.

How will the Complex promote and cultivate the relationship with the Friends of the National Wildlife Refuges of Rhode Island?

- We would continue to implement the 1999 Memorandum of Understanding (MOU) and Cooperative Agreement established between the Service and the Friends of the Refuges, which includes providing the Friends of the Refuges with technical, administrative, and resource support.
- We would continue to provide the Friends of the Refuges an office at the Refuge Complex Headquarters.

Issue 11: Hunting on the Complex

Neither current nor past management has promoted a hunting program. The limited contiguous land base to support an effective hunt area is problematic for Chafee and Block Island Refuges. The proximity of human habitation and town facilities is a concern for Chafee, Ninigret, and Trustom Pond Refuges. The 151 acres deed-restricted from hunting on Trustom Pond Refuge further limit possibilities. On Sachuest Point Refuge, the impenetrable vegetation precludes hunting altogether. These factors, combined with our small staff size, has hampered our ability to plan and implement a high quality hunt program. We define quality not only by the hunter's experience (e.g. safety, ethical behavior, uncrowded conditions, diversity of experience), but also by the effect of hunting on wildlife populations, ecological integrity and aesthetics, and minimizing conflicts with other wildlife-dependent recreational users (unpublished draft Service policy on hunting Part 605 FW 2).

We know little about huntable wildlife populations and their influence on refuge habitats. Further, local communities are divided in their support for a hunting program and there is the perception that a hunting program would reduce other priority, wildlife-dependent public use opportunities, such as wildlife observation and environmental education, disproportionate to local needs and interests.

What hunting opportunities will be available on Block Island, Ninigret, and Chafee Refuges?

- Given the circumstances presented above, Refuge staff have not pursued a hunt program and these three refuges would remain closed to hunting under Alternative A.

What hunting opportunities will be available at Sachuest Point?

- A quality public hunt program is not feasible, due to the preponderance of thick, impenetrable, shrub vegetation and the lack of huntable populations of wildlife.

What hunting opportunities will be available at Trustom Pond Refuge?

- Given the circumstances presented above, except for a 20-acre upland field, refuge staff have not pursued a hunt program and Trustom Pond Refuge would remain closed to hunting under Alternative A.
- We would continue to maintain the 20-acre upland field in cool season, non-native grasses and open to migratory bird hunting.
- RI DEM would continue to administer the hunt program under Refuge regulations.

Issue 12: Opportunities for environmental education

What curriculum-based environmental education opportunities will be available at Block Island Refuge?

- The Nature Conservancy would continue to conduct environmental education on Refuge land, but current management does not provide financial or staff support.

What curriculum-based environmental education opportunities will be available at Ninigret Refuge?

- Under its existing MOA, Frosty Drew Nature Center would continue its environmental education trips to the Refuge.
- A for-profit group would also continue to conduct environmental education on the Refuge.

What curriculum-based environmental education opportunities will be available at Chafee Refuge?

- Due to the limited number of staff specializing in environmental education, and the relative newness of this Refuge, we are just beginning to establish a relationship with its neighboring communities. Current management provides no environmental education on the Refuge.

What curriculum-based environmental education opportunities will be available at Sachuest Point Refuge?

- The Norman Bird Sanctuary, which has a land base adjacent to the Refuge, conducts environmental education on the Refuge. We would continue to work with the Sanctuary on an informal basis.

What curriculum-based environmental education opportunities will be available at Trustom Pond Refuge?

- Volunteers would continue environmental education at the mock nest enclosure, barrier beach, and farm pond. We would maintain these sites and their materials for use each year. We would continue to work with the Friends of the Refuges to develop a barrier beach education kit for teachers.

Issue 13: Ability to provide staffing, operations, and maintenance support needed to accomplish goals and objectives

How does the Alternative A change the funding requirements of the Complex?

- Our fiscal year 1999 operations budget was \$441,000.00, plus \$28,000.00 for maintenance. Appendix F contains the projects currently identified in the Refuge Operating Needs System (RONS) and Management Maintenance System (MMS) for FY2000.

What will be the staffing needs of the Complex?

- To operate at existing staffing levels: nine full time personnel, one student trainee, and four seasonal personnel (see Appendix H).

How will the Service ensure the protection of cultural resources on the Complex?

- We would continue to survey Refuge projects as needed to comply with Section 106 of the National Historical Preservation Act. We would also continue to plan interpretive opportunities on the Ninigret Refuge Trail Through Time, which will include signs interpreting Native American and U.S. Naval Aviation History.

Issue 14: Increased visibility of the U.S. Fish and Wildlife Service

How will we increase Service visibility and recognition of the National Wildlife Refuge System?

- Continue boundary posting as funding allows. None of the Complex is completely posted.

Issue 15: Need for improved facilities

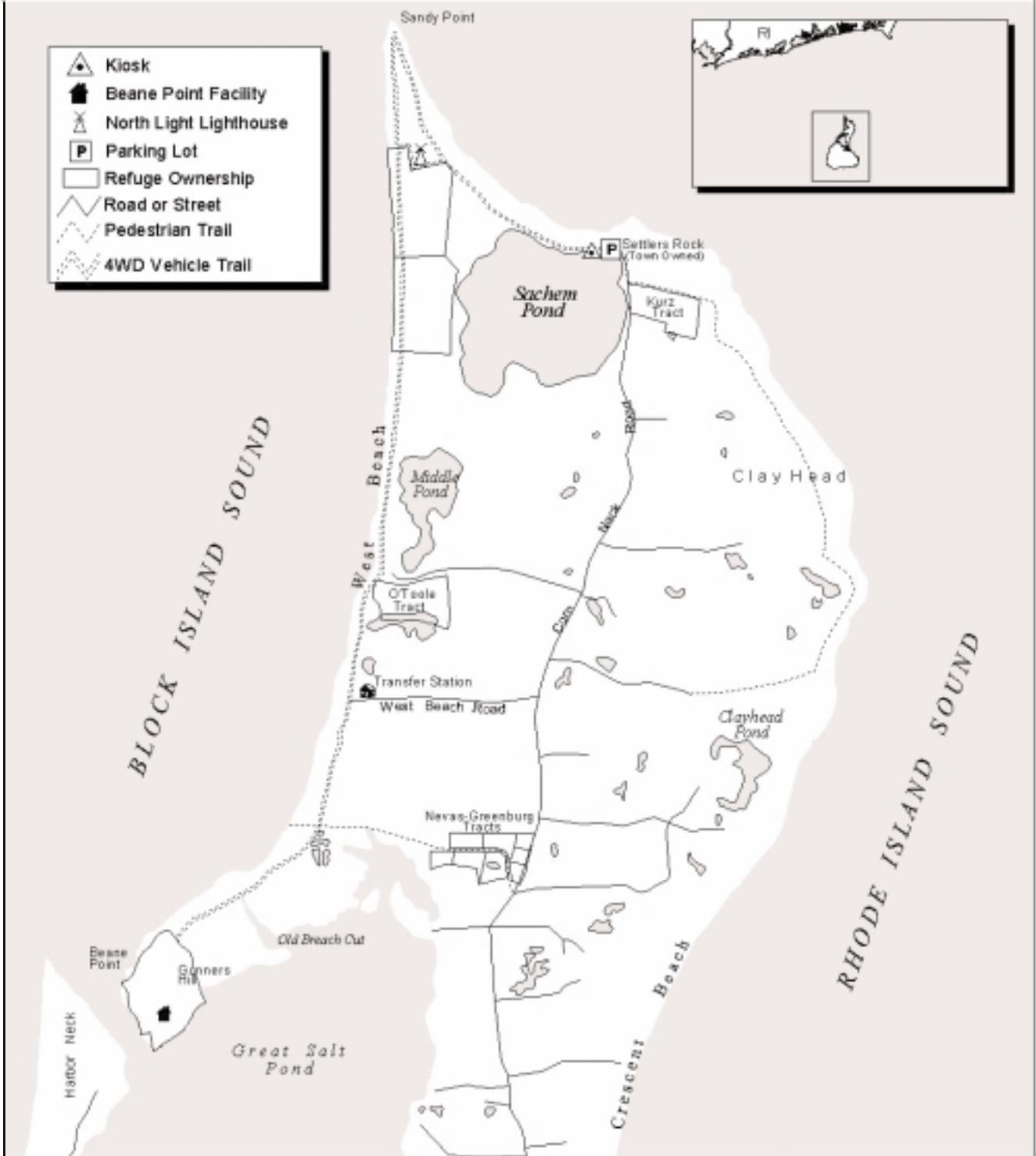
What facilities are needed to improve administrative and visitor contact services on the Complex?

- We would maintain existing administration and visitor contact facilities. We would maintain and staff the existing visitor contact station at Trustom Pond Refuge with volunteers. We would continue to renovate the Sachuest Point visitor center as funding allows.
- Under Alternative A, we would also continue with site selection and planning for the Complex visitor center and headquarters. We would begin an EA once a final list of prospective sites has been determined. Construction should be completed by 2003.

When will the Complex improve road and entry signs to meet national standards and better serve visitors?

- Only one sign on U.S. Route 1 directs visitors to any of the refuges. None of the Refuge Complex signs meet Refuge System standards. No other directional signs are planned.

Alternative A: Current Management
 Existing Public Use/Habitat Improvement
 Block Island National Wildlife Refuge
 Rhode Island NWR Complex Comprehensive Conservation Plan

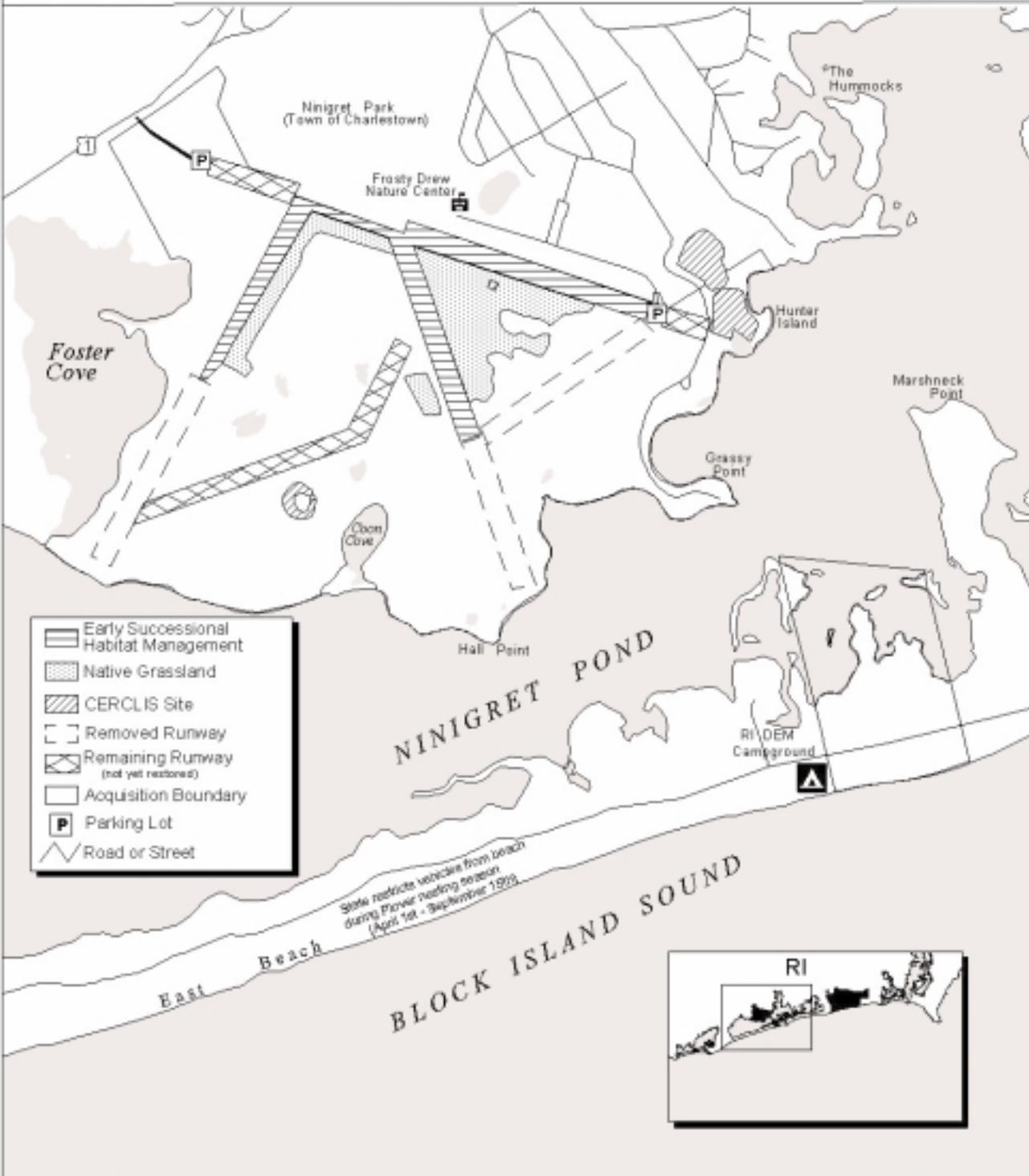


Data Sources:
 USGS 1:24,000 Roads & Hydrography
 All other data provided by USFWS, RIGIS
 & Co. New England/WY Light Coastal Program.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan,
 December 2000
 Maps to be used for legal purposes.

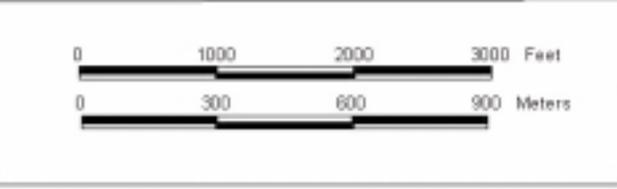


Alternative A: Current Management Existing Habitat Improvements Ninigret National Wildlife Refuge

Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 8000 1:24,000 Roads & Hydrography
 Aerial data provided by USFWS, WDOI
 & Co. New England's Right Coastal Program
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan
 December 2002
 NOT to be used for legal purposes.

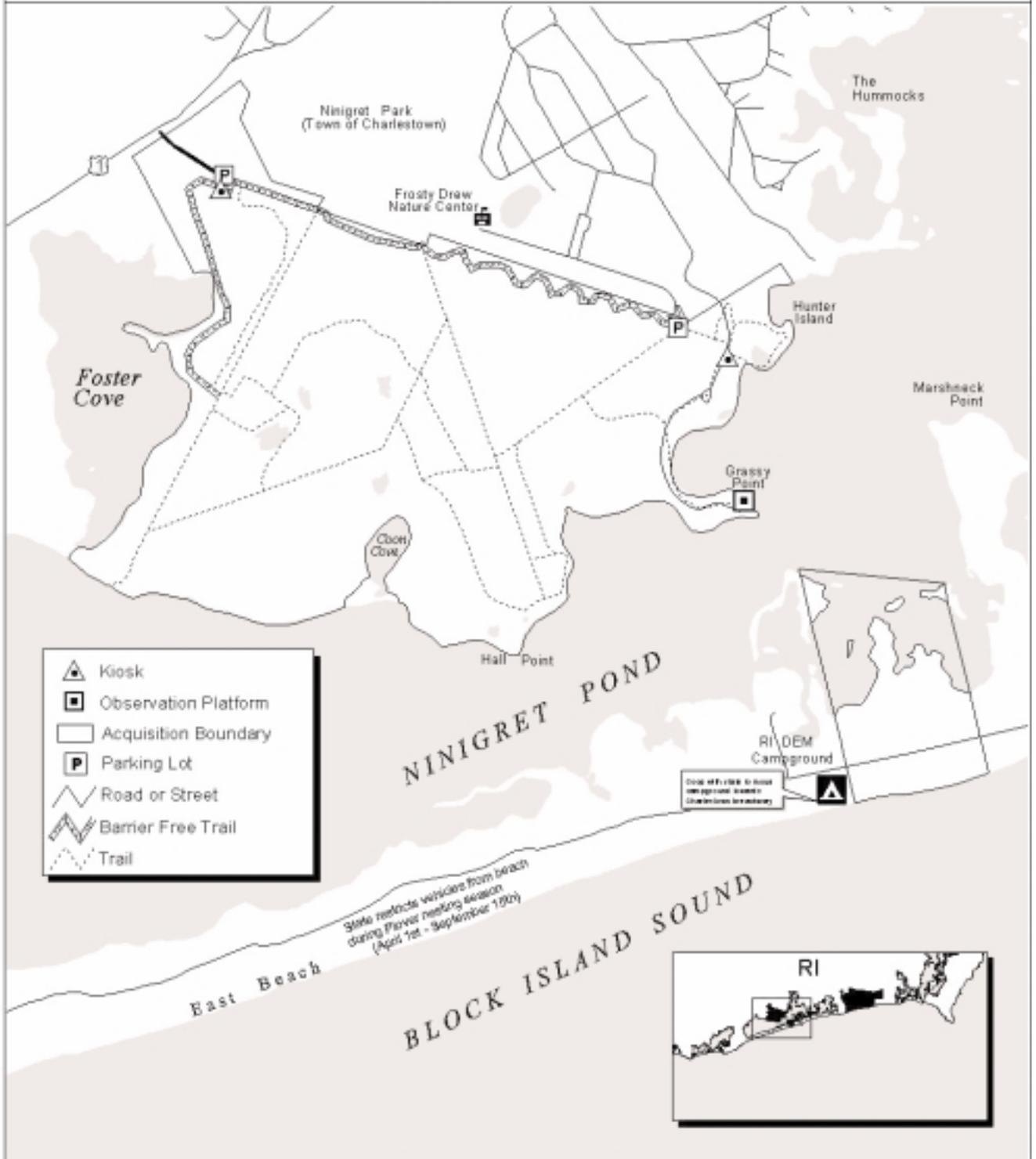


Alternative A: Current Management

Existing Public Use

Ninigret National Wildlife Refuge

Rhode Island NWR Complex Comprehensive Conservation Plan



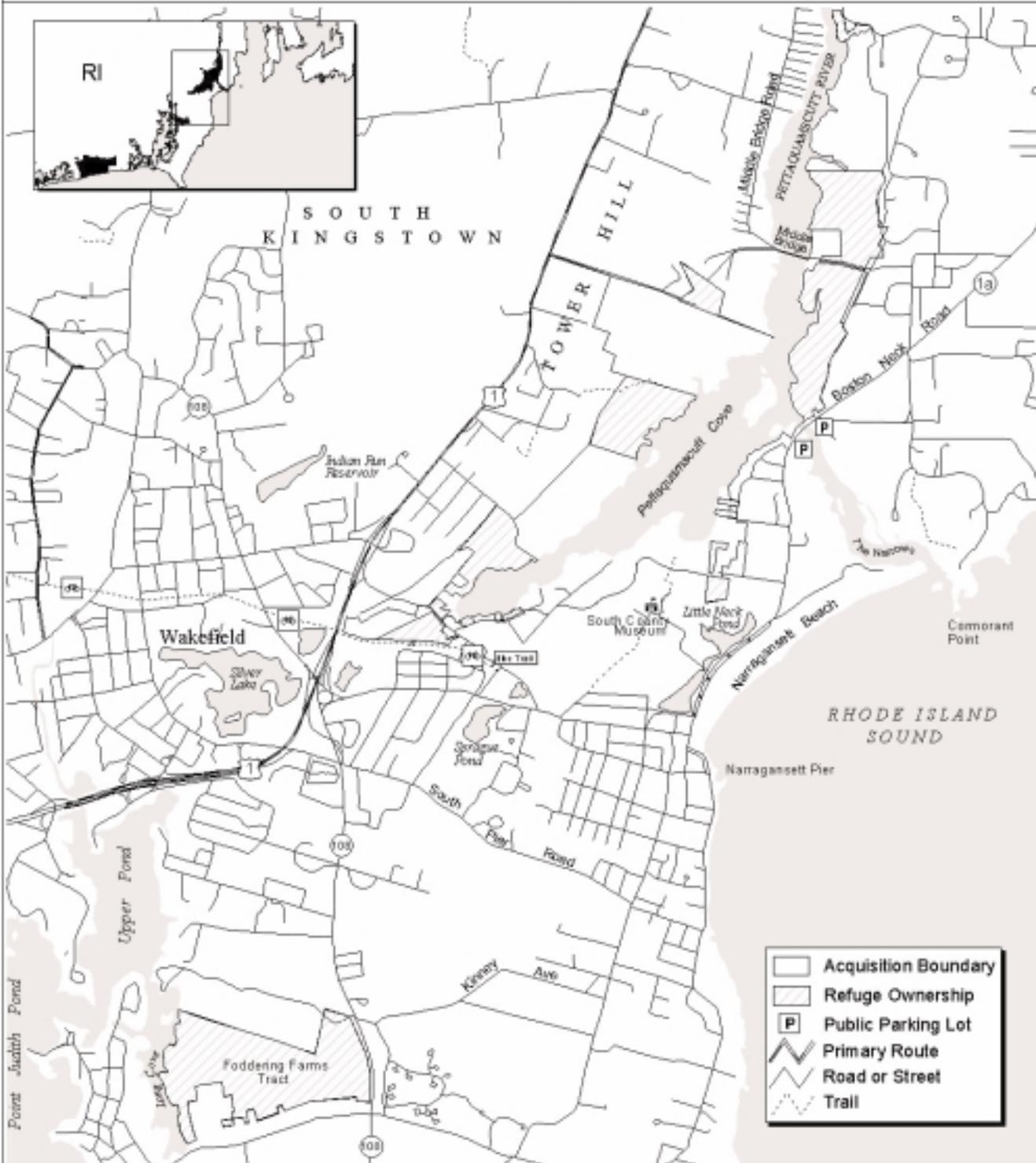
	Kiosk
	Observation Platform
	Acquisition Boundary
	Parking Lot
	Road or Street
	Barrier Free Trail
	Trail

State Wildlife Refuge
 Acquisition Boundary

Data Sources:
 USGS 1:24,000 Scale & Hydrography
 Aerials digitized by ESRI, ESRI
 & So. New England Right Coastal Region.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan
 December 2000
 Not to be used for legal purposes.



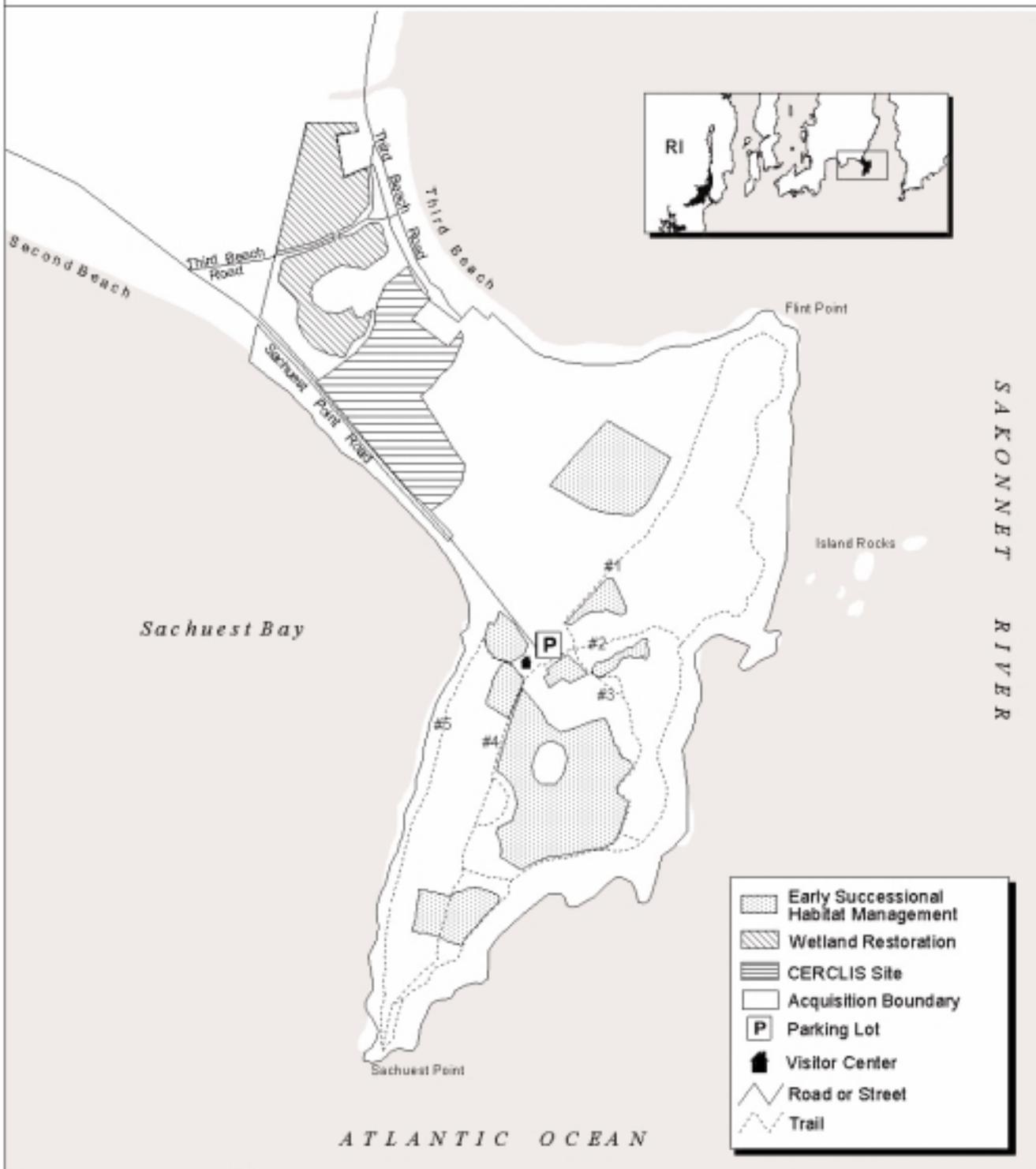
Alternative A: Current Management
 Existing Public Use/Habitat Improvement
 John H. Chafee National Wildlife Refuge
 Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,250 Roads & Hydrography
 All other data provided by USFWS, RIGIS
 & So. New England/NY Right Coastal Program.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan,
 December 2000
 Not to be used for legal purposes.



**Alternative A: Current Management
Existing Habitat Improvements
Sachuest Point National Wildlife Refuge
Rhode Island NWR Complex Comprehensive Conservation Plan**

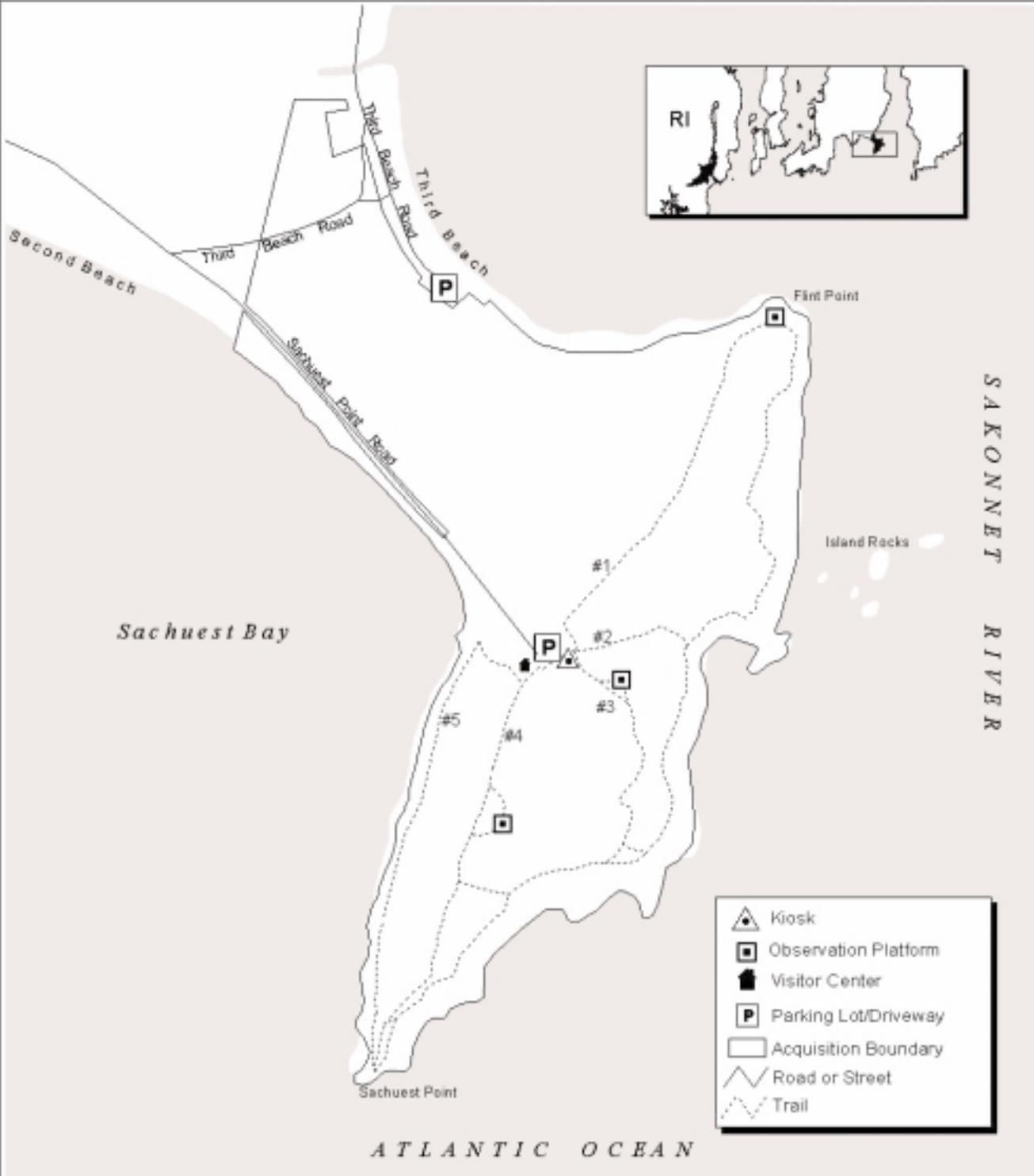


Data Sources:
USGS 1:24,880 Roads & Hydrography
All other data provided by USFWS, RIGIS
& So. New England/NY Right Coastal Program.

Map prepared for Rhode Island NWR Complex
Comprehensive Conservation Plan,
December 2000
Not to be used for legal purposes.



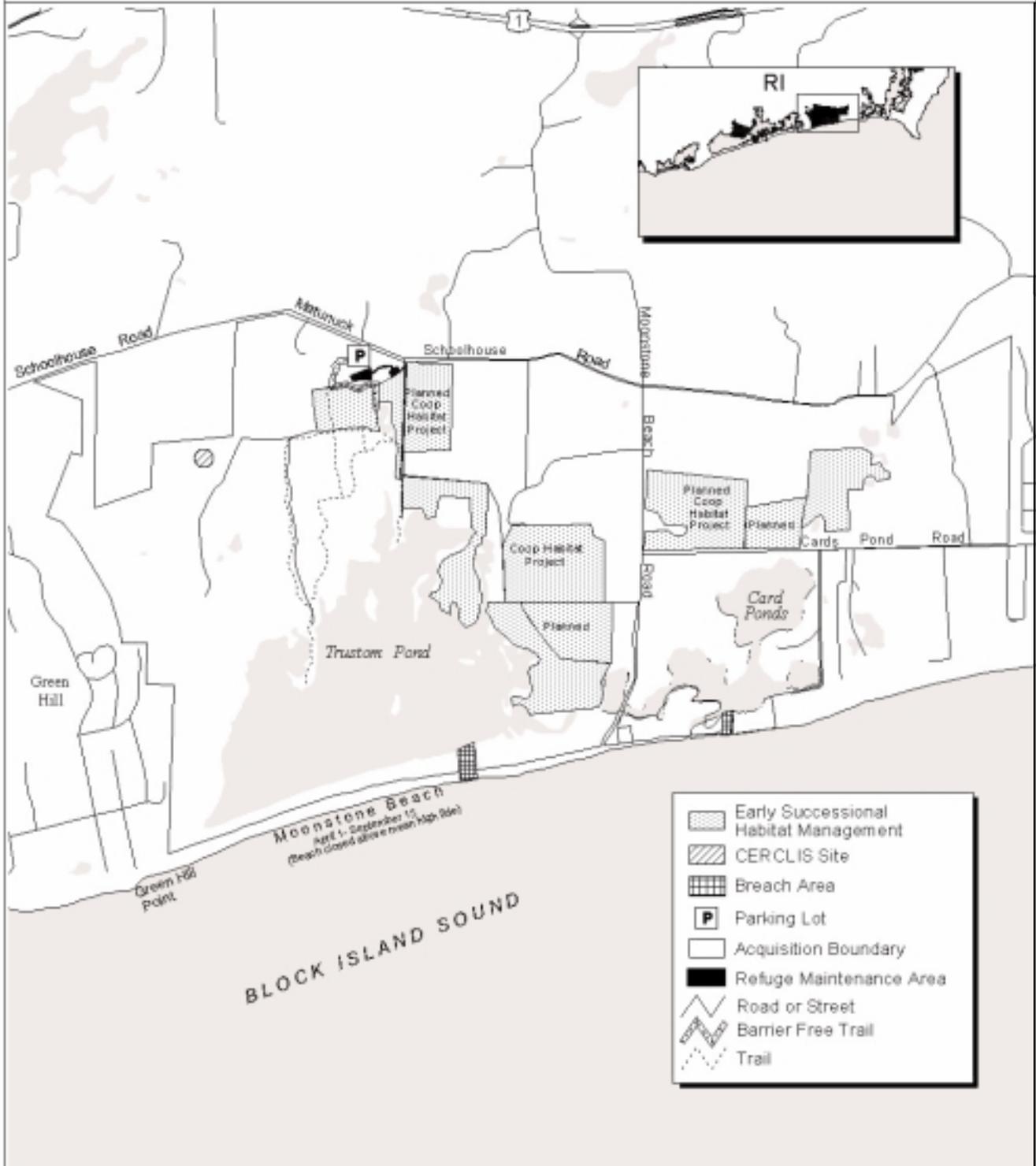
Alternative A: Current Management
Existing Public Use
Sachuest Point National Wildlife Refuge
Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 Road & Hydrology
 All other data provided by USFWS, RI DNR
 & Co. New England NWR Joint Capital Program.
 Map prepared for Book titled *RI NWR Complex*
 Comprehensive Conservation Plan.
 December 2000
 NOT TO BE USED FOR LEGAL PURPOSES.



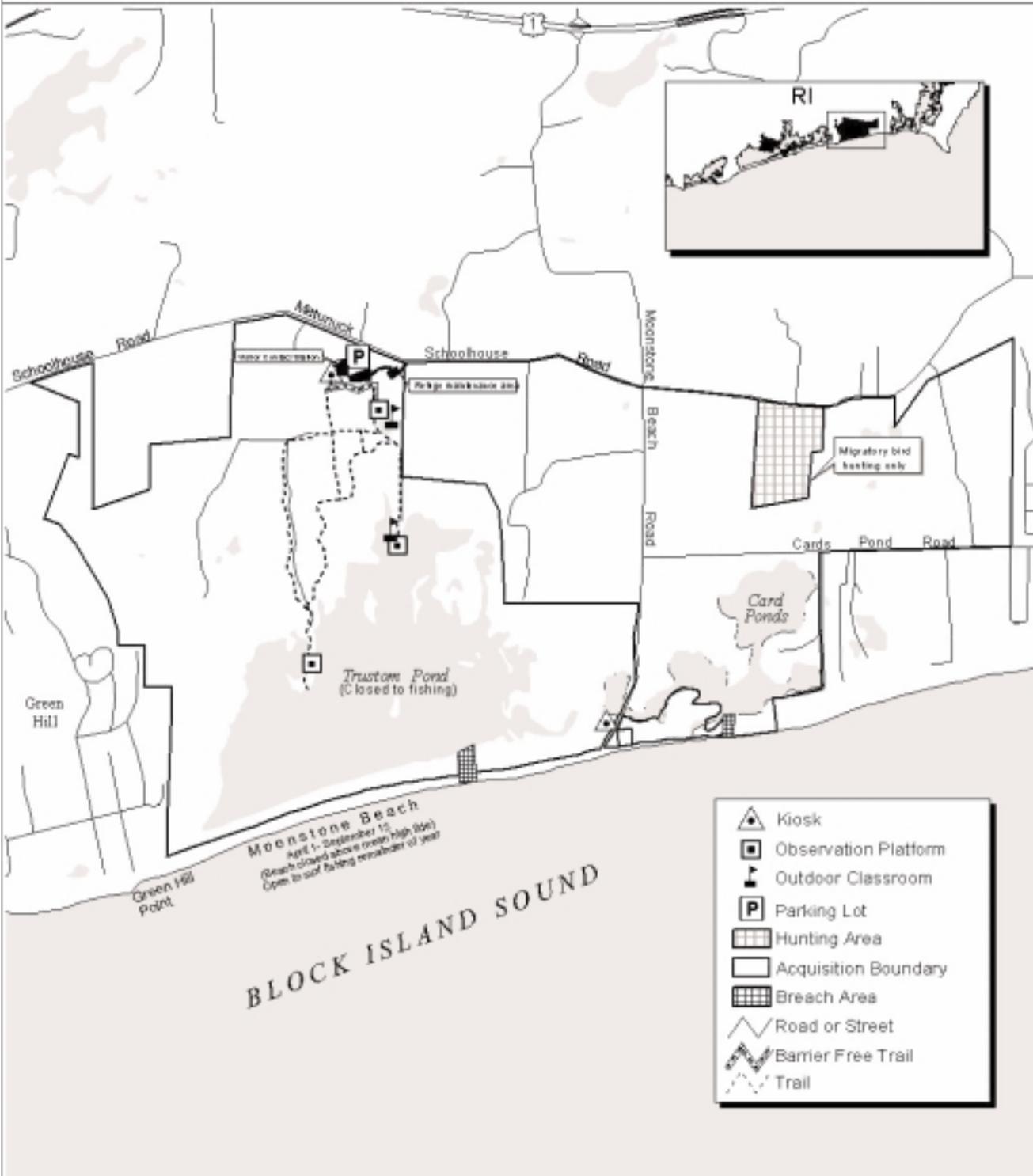
Alternative A: Current Management Existing & Currently Planned Habitat Improvements *Trustom Pond National Wildlife Refuge* *Rhode Island NWR Complex Comprehensive Conservation Plan*



Data Sources:
 1:25,000 Scale & Hydrography
 Aerial data provided by USFWS, RIWS
 & Co. See Appendix B for Coastal Program.
 Map prepared by Rhode Island State College
 Coastal & Estuarine Conservation Program
 December 2000
 Not to be used for legal purposes.
 Coordinate system is NAD 83 datum.



Alternative A: Current Management
Existing Public Use
Trustom Pond National Wildlife Refuge
Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 Road & Hydrology
 All other data provided by USFWS, RI DNR & So. New England's Joint Coastal Program.
 Map prepared for Block Island NWR Complex Comprehensive Conservation Plan, December 2000.
 Not to be used for legal purposes.
 Coastal Boundary and other data provided by USFWS.



Alternative B: The Service's Proposed Action

Alternative B, as our Proposed Action, is the alternative we recommend for consideration and approval by our Regional Director. It combines management actions from Alternatives A, C, and D which, in our best professional judgment, actively work toward achieving the vision and goals for the Complex, the Connecticut River/Long Island Sound Ecosystem, State and regional biodiversity plans, the purposes for which the refuges were established, and most effectively addresses the key issues. In some program areas, it enhances the quality and sustainability of current resource programs by increasing staff, developing long-range and strategic step-down plans, promoting partnerships, and restoring habitat and species on each of the Refuges.

Alternative B would notably increase our land acquisition and cooperative land protection, including 3,200 additional acres approved for acquisition. It would increase protection for threatened, endangered, and other species of management concern, and expand the existing, early successional coastal sandplain and maritime habitat projects and wetlands restoration. We would develop an integrated ecosystem plan for Trustom Pond; incorporating restoration needs of the adjacent uplands that influence the pond with restoration of the aquatic system. Our treatment of invasive, non-native plants would notably increase. It would also increase biological inventories and monitoring to improve our understanding of the biodiversity on the Complex.

Alternative B would improve substantially the quality of existing, priority, wildlife-dependent public uses, especially in environmental education and interpretation. Fishing would continue on all refuges. We would develop new opportunities across the Complex for hunting, wildlife observation and photography, and environmental education and interpretation. We expect Alternative B to increase the number of Complex visitors by approximately 20 percent as a result of increased public use programs, improvements to the Sachuest Point visitor center, and construction of the new Refuge Complex visitor center and headquarters by 2005.

While overall public use opportunities would increase, Alternative B would impose limits on access and enforce the use of designated travel ways in some sensitive areas. We would establish a year-round Service presence at Sachuest Point Refuge and a seasonal presence on Block Island Refuge. Increased outreach, education, and enforcement would assist in phasing out nonwildlife-dependent and incompatible activities by 2005 (using ORVs, walking dogs, swimming and sunbathing, jogging, kite flying, bicycling, roller blading, horseback riding, and setting bonfires).

Increasing involvement by volunteers, partners, and the Friends of the Refuges would strengthen our support in the local community. The visibility of the Service in general, and the Complex in particular, would be elevated. Fully implemented, Alternative B would more than double current staffing, and notably increase budget allocations over their current levels.

Issue 1: Protection of endangered and threatened species and other species and habitats of special concern

How will piping plover nesting sites be protected at Trustom Pond Refuge?

The Proposed Action builds on Alternative A for increased piping plover nest protection. Our objective is to meet or exceed a 5-year average of 1.5 fledged chicks/pair per year (1996 Revised Piping Plover Recovery Plan). An additional annual objective is to meet or exceed the site's estimated nesting carrying capacity (10 pairs in 1999), which may vary from year to year given the dynamics of the beach ecosystem. In general, we hope to achieve this by increasing the amount and duration of protection and monitoring of nesting sites, and through habitat improvements, as outlined below.

In addition to Alternative A, we would:

- By 2003, hire a minimum of three seasonal law enforcement personnel to manage public use in plover nesting areas, and hire two seasonal biological technicians to increase biological monitoring of all nest sites. Not all seasonal staff would be supported through Refuge funding; some would be funded from other sources procured by the Piping Plover Coordinator (see below). Refuge-funded seasonal staff may also support other priority biological program activities.
- By 2003, we would reassess the nesting carrying capacity for Moonstone Beach; last evaluated in 1999. This information would then be used to assess potential habitat improvements as recommended under Issue 4 below.

How will piping plover nesting sites be protected at Ninigret Refuge barrier beach and active sites in the South Shore of Rhode Island?

As mentioned above for Trustom Pond, the Proposed Action would afford increased protection for piping plover nest sites. Our objective is to meet or exceed a 5-year average of 1.5 fledged chicks/pair per year (1996 Revised Piping Plover Recovery Plan). An additional annual objective is to meet or exceed the site's estimated nesting carrying capacity (20 pairs in 1999), which may vary from year to year given the dynamics of the beach ecosystem.

In addition to Alternative A, actions would include:

- By 2002, work with RI DEM to move the State campground, currently located near Ninigret Refuge, towards the breachway to concentrate human activities and reduce direct and indirect human associated impacts in nesting areas. Trash is often implicated in attracting predators to a nesting area. Campers in the area often bring dogs. Unleashed dogs have been documented chasing adult plover off nest sites.
- By 2002, develop written cooperative agreements with at least five South Shore landowners with existing plover nesting sites. This is to document formal acknowledgment of permission to access and manage piping plover nest sites.

- By 2003, reassess nesting carrying capacity on Ninigret Refuge barrier beach and adjacent Ninigret Conservation Area. Continue reassessments on a three year basis.
- By 2004, we would hire a Rhode Island Piping Plover Coordinator who would provide visibility and oversight to the South Shore and Refuge Complex piping plover programs, and facilitate interagency funding and cooperative management of the South Shore nesting areas.

The Rhode Island Piping Plover Coordinator would a) coordinate outreach and education; b) complete cooperative agreements with private landowners (see above); c) coordinate with towns to develop contingency plans (see below); d) coordinate piping plover research on the Refuges; e) hire seasonal biological technicians; f) seek outside funding to help support the South Shore program; g) coordinate habitat evaluations and monitoring (e.g. determine nesting carrying capacities, habitat parameters to monitor, and predator trapping effectiveness).

Active support and coordination by Ecological Services, RI DEM, and local landowners would be required to ensure success.

How will piping plover nesting sites be protected in the Block Island Focus Area?

Under the Proposed Action our objective is to sustain a 5-year average of 1.5 fledged chicks/pair per year (1996 Revised Piping Plover Recovery Plan) on at least one site in the Block Island Focus Area. Our priority would be to reestablish nesting on the Refuge. We hope to achieve this by increasing protection and monitoring of suitable habitat and determining limiting factors, as outlined below.

- Suitable piping plover habitat on the Refuge would be symbolically fenced by April 1 each year through September 15.
- Nest exclosures would be erected as soon as a nests are located.
- By 2002, close Refuge beaches above the mean high tide line to vehicles from April 1 to September 15 each year to reduce disturbance to nesting and migrating shorebirds and to reduce physical impacts to the barrier beach.
- By 2003, hire a biological technician, to be stationed locally, who would work with The Nature Conservancy to monitor suitable plover habitat, potential habitat, and public use activities in the Block Island Focus Area.
- By 2003, Refuge staff would monitor gull populations, in cooperation with ongoing RI DEM and The Nature Conservancy surveys, to ascertain whether gulls are limiting plover nesting.
- By 2003, formalize the current verbal agreement with Town of New Shoreham, through use of a cooperative agreement, to insure continued implementation of town beach restrictions on public use when active piping plover nesting occurs. Determine where symbolic fencing could be placed on town beach by April 1 of each year on an experimental basis, with the objective of enhancing the potential nesting habitat on the adjacent Refuge.

Measures proposed for beach strand protection (Issue 3) would provide additional protection for piping plover.

How will piping plover predators be managed on Rhode Island Refuge Complex nesting sites?

Under the Proposed Action our objective is to minimize predation of piping plover at each nesting site through the use of exclosures or removal of animals where its warranted and feasible. We would continue to document statistics on predation at each site in annual piping plover reports. Specific actions would include:

- Continue the current predator control program at piping plover and least tern nesting sites each year, as identified in Alternative A, until 2004, when we would complete an Integrated Predator Management Plan. This plan would include an evaluation of the effectiveness of predator management practices used at these nesting sites. We would adapt current strategies, as needed, to minimize the impact of predators on nesting piping plover and least tern.
- The Fur Resources Committee of the International Association of Fish and Wildlife Agency's technical report on "Best Management Practices for Trapping Furbearers" once completed, would be utilized in developing the Integrated Predator Management Plan.

How can piping plover habitat be improved at Trustom Pond Refuge?

Under the Proposed Action, our objective is to take an ecosystem-based approach to managing Trustom Pond, recognizing the natural coastal formation processes and dynamism that shaped the pond, and the relationship with species, including piping plover, dependent on these processes.

- By 2005, working with partners, we would develop an integrated habitat management, monitoring and evaluation plan for Trustom and Cards Salt Ponds based on consideration of all the significant natural resource values provided by these ponds. The development of this plan, with respect to piping plover and shorebirds, would include the following:
 - Evaluate potential for creating additional shorebird habitat through mechanical dune scarification and other techniques, along with the frequency and timing of breaching on Trustom Pond Refuge (refer to Recovery Plan tasks 1.242 and 1.243).
 - Investigate other potential strategies for managing the Trustom Pond breachway to maximize habitat benefits for piping plover. We would utilize the nesting capacity habitat assessment to evaluate habitat potential.
 - Identify an implementation schedule for the proposed projects.

How will the Service coordinate with other agencies and private landowners to protect piping plover throughout the South Shore of Rhode Island?

Under the Proposed Action our objective is to increase cooperative management of nesting areas, including proactive planning and management of potential nesting sites (e.g. those not yet occupied). In addition to actions in Alternative A, and those proposed for the Piping Plover Coordinator above, we would:

- By 2007, coordinate with private landowners and towns to develop contingency plans in anticipation of unexpected events such as oil spills at nesting sites or the “pioneering” of new nest sites on recreational beaches.

How will the Refuge Complex increase public awareness of piping plover issues through outreach and education?

The Proposed Action would build on the actions included in Alternative A to further increase public awareness of piping plover issues. Our objective is to develop a piping plover outreach and education program specifically targeted at the people using these Rhode Island beaches. Actions would include:

- By 2002, develop an education and outreach plan for the piping plover program, which would include:
 - identification of target audiences (e.g. beach front landowners, elected officials, tourists, and local school children)
 - distribution of literature with RI DEM beach use permits, at beach entrance stations, and other focal points;
 - a major exhibit at the new Visitor Center; and
 - integration with local school curriculums.
- Utilize the Friends Group and other partners to develop and implement the plan.
- By 2003, we would hire two additional seasonal park aids to conduct outreach and education on-site or in the communities directly affected by piping plover management.

How will the Refuge Complex ensure that piping plover management practices are based on sound science?

Research efforts over the last 20 years have substantially increased our understanding of piping plover protection needs and the effectiveness of conservation efforts throughout its range; however, specific factors influencing nest or chick loss can vary considerably from site to site. Under the Proposed Action, our objective is to gain a better understanding of the site-specific factors affecting Rhode Island nesting sites and to undertake management actions recommended or accepted by the piping plover scientific community.

- The Refuge Biologist would coordinate annually with the Plover Recovery Team and other scientists to obtain new research results and share the effectiveness of management techniques.
- By 2003, work with partners to establish piping plover research needs for the Refuge Complex, with highest priority given to determining those factors most-influencing chick survival on the Refuges.
- By 2005, we would obtain funding to initiate the highest priority project.

How will the Refuge Complex contribute to the protection and restoration of the American burying beetle population within the Block Island Focus Area?

Under the Proposed Action our objective would be for Refuge staff to gain a better understanding of American burying beetle ecology on Block Island in order to evaluate the possibility of expanding the island population to Refuge land.

- By 2003, we would actively participate in ongoing annual monitoring, led by RI DEM, The Nature Conservancy, and our New England Field Office, of American burying beetles on southern Block Island.
- By 2005, we would work with these partners to assess opportunities for beetle inventory and management within the Focus Area with an objective to expand the distribution of the existing population on Block Island. Efforts to protect waterbirds (*see below*) will also benefit the American burying beetle through increased availability of carrion.
- Once the Refuge land base has increased, and the potential for burying beetles has been determined, we would evaluate up to 50 acres for conversion from shrubland to grassland to benefit the beetle. We would coordinate restoration work with RI DEM and The Nature Conservancy.

How will the Refuge Complex protect bald eagle habitat within the Block Island Focus Area?

Under the Proposed Action, our objective is to increase monitoring of bald eagle use on the Refuge and follow-up with protection measures if warranted. Actions would include:

- By 2003, a seasonal biological technician would monitor roosting eagles observed on Block Island. We would also coordinate with The Nature Conservancy to identify potential threats to roosting eagles, such as human disturbance and/or habitat degradation.
- By 2005, we would develop site management and monitoring plans, if such plans are warranted by consistent bald eagle use of Refuge lands.

How will the Refuge Complex contribute to establishing populations of northeastern beach tiger beetles in the South Shore Area of Rhode Island?

Under the Proposed Action our objective is to contribute to the recovery of the northeastern tiger beetle through reintroduction efforts initiated by the Service's New England Field Office. Actions would include:

- By 2010, we would coordinate with the New England Field Office and RI DEM to determine the feasibility of reintroducing the beetles on the Rhode Island Refuge Complex. In addition, we would identify and prioritize habitat for reintroduction within the South Shore Focus Areas. Napatree Point has specifically been identified as a prospective site. Potential reintroduction sites for the species would be identified as a high priority for land acquisition if long term protection measures are not in place.

- By 2012, we would develop site management and monitoring plans for prospective reintroduction sites on the Refuge Complex.

How will the Refuge manage habitat for black duck at Chafee and Trustom Pond Refuges?

Under the Proposed Action our objective is to maintain high quality black duck wintering habitat where it occurs on the Refuge Complex through management of public use and control of invasive, non-native plant and animal species. Actions would include:

- Maintain the current, limited public access to the 160-acre Trustom Pond to minimize human disturbance and facilitate its highest and best use as a wildlife sanctuary, including its importance to migrating and wintering waterfowl.
- By 2001, pursue zero productivity of mute swan by adding eggs and lethal and non-lethal removal of some adults.
- By 2003, work with RI DEM to develop a waterfowl management area plan for the entire Pettaquamscutt Cove and Lower Narrow River. The plan would evaluate and designate waterfowl resting habitat while also continuing hunting opportunities in the area.
- If the plan recommends a public hunt on Refuge land, it would be by boat, designated trail access, or from blinds, administered in cooperation with RI DEM under Refuge regulations.
- By 2003, treat at least 5 acres per year of Phragmites or other invasive wetland plants across the Complex through mechanical, chemical, or biological treatments to improve habitat for black duck and other waterfowl. Particular emphasis would be at Trustom Pond.

How will the Refuge protect wintering harlequin duck at Sachuest Point Refuge?

Harlequin ducks congregate during the winter just offshore of Sachuest Point Refuge. Since they typically forage and rest in open water or on offshore rocks, they are not on Refuge land and we have not directly managed for them. Under the Proposed Action our objective is to take advantage of this unique viewing attraction to educate Refuge visitors on the plight of harlequin duck and to promote coastal resource stewardship. We would also increase monitoring of harlequin duck activities to ensure shoreline visitors are not affecting their behavior.

In addition to standardizing the weekly counts identified in Alternative A, specific actions include:

- By 2002, work cooperatively with RI DEM to regulate a shoreline hunting closure from the Sachuest Point Refuge boundary to the low water line. This action would enhance Sachuest Point as a Watchable Wildlife Area for observing harlequin duck and reduce conflicts between shoreline sea duck hunters and other Refuge visitors.
- By 2004, begin monitoring public use to determine if the amount or timing of shoreline visitors on the Refuge affects the activities of wintering harlequin duck.

How will waterfowl concentration areas be managed on the Refuge Complex?

Under the Proposed Action our objective is to build on the actions included in Alternative A to further enhance existing waterfowl concentration areas, including:

- By 2005, work with partners to develop an integrated habitat management, inventory and monitoring plan for Trustom Salt Pond.
- In addition, see above proposals for managing black duck on Trustom Pond and Chafee Refuges.

How will important marsh and wading bird habitat areas be protected on the Refuge Complex ?

Under the Proposed Action our objective is to protect and sustain the one rookery on Block Island, evaluate historic sites across the Refuge Complex, and identify prospective new sites to determine if rookeries can reestablish or expand.

- By 2003, we would utilize a seasonal technician to participate in annual monitoring of the Block Island rookery site. Monitoring is currently conducted by RI DEM and The Nature Conservancy.
- By 2003, we would work with these partners to identify threats to the rookery and evaluate the pine stand supporting the rookery on Beane Point to determine whether or not to replant native vegetation and maintain existing nesting capability.
- By 2005, we would initiate an inventory for marsh and wading birds at high probability sites on the Refuge Complex to determine seasonal occupancy and nesting sites.

How will least tern nesting sites be protected on the Refuge Complex?

Under the Proposed Action, our objective is to increase nesting productivity in the least tern colony on Trustom Pond Refuge's Moonstone Beach, primarily through increased predator management. Additional protection would result from activities proposed for piping plover management. In addition to current management, actions would include:

- By 2001, adapt the predator fencing design to target smaller mammals (e.g. weasels) striving to minimize the loss of least tern from predators. Predator control measures proposed for piping plover under this Alternative would also benefit least tern.

How will the Service protect and improve feeding and staging shorebird concentration areas along the South Shore of Rhode Island and on Block Island?

Under the Proposed Action our objective is to protect shorebird staging areas on the Refuge Complex beaches through management of public use and access. Actions would include:

- By 2002, close Block Island Refuge beaches to vehicles from April 1 to September 15 above the mean high tide line to reduce disturbance to nesting and migrating shorebirds.
- Use the U.S. Shorebird Conservation Plan (once completed) to update management strategies based on any newly identified imperiled species (draft Shorebird Prioritization System 1999).
- By 2005, map key staging and feeding areas in the South Shore ABS.
- Develop and implement a plan for evaluating potential threats and disturbances for key areas on the Complex. Use outreach and education and, if necessary, restrictions on public use and access.

How will the Refuge Complex protect and manage other landbirds of management concern on the Rhode Island Refuge Complex?

Under the Proposed Action our objective is to identify and manage for those landbirds considered by Partners In Flight a priority and for which the Refuge Complex could significantly contribute to their conservation. In addition to Alternative A, actions would include:

- By 2002, utilize the “Partners in Flight Landbird Conservation Plan for Southern New England” (draft Oct 1998), or the Service’s Region 5 Regional Resources Assessment to identify and prioritize those landbirds of highest management concern on the Refuge Complex, and assess how current management practices are impacting them.
- By 2004, determine which of these landbirds should be a focus for future management on each Refuge. Incorporate objectives into the Refuge Complex Habitat, Monitoring, and Inventory Plans after determining each species’ habitat requirements and the desired mix, size, and distribution of cover types required to sustain them.

How will the Refuge Complex protect seal haul-out areas on Refuge lands?



Harbor Seal

There are no significant concentrations of seals on Refuge lands; haul-out areas on these Refuges generally are used by only small groups of two to six seals. Block Island Refuge’s Beane Point and Sachuest Point Refuge’s shoreline are two areas where seals are frequently observed. Under the Proposed Action, our objective is to begin to monitor seal use on the Refuge Complex to ascertain whether or not management actions are needed.

- Beginning in 2005, we would work with partners to survey seal haul-out areas on the Refuge Complex and determine if human disturbance is a threat. We would attempt to reduce human disturbance through public outreach efforts. Access would be restricted if necessary.

How will the Refuge Complex improve anadromous fish habitat in Pettaquamscutt Cove (Narrow River), Trustom Pond, and the Wood-Pawcatuck Rivers?

Our ability to directly improve conditions for anadromous fish habitat is currently limited to Trustom Pond, of which we know little about current fish populations or the condition of its other aquatic resources. Under the Proposed Action our objective is to work with aquatic experts to understand what resources we should evaluate and monitor in Trustom Pond, and which management actions would be most effective in improving conditions.

- By 2005, we would work with partners to develop an integrated management plan for Trustom Salt Pond. Opportunities to provide spawning and nursery habitat, waterfowl and shorebird habitat, and water quality would be evaluated and prioritized.
- Also by 2005, we would become an active participant in the RI CRMC proposed Narrow River Working Group, once established, and/or the South County Watershed Partnership to promote increased watershed protection.

How will the Refuge Complex protect amphibian and reptile populations and habitats on Refuge lands?



Brown snake. USFWS photo

Recent studies conducted by the University of RI have revealed that Ninigret and Trustom Pond Refuges are very important to the reptile and amphibian population in the South County area; in fact, the highest density of two amphibian species known for Rhode Island occurs on the Refuges. Unfortunately, we know little about how these amphibians and reptiles utilize Refuge habitats seasonally, in particular during the spring amphibian migrations. Under the Proposed Action, our objective is to promote an appreciation of amphibian and reptile conservation, and to actively manage to protect and sustain current populations on the Refuge.

We would do the following:

- By 2005, develop environmental education and interpretation programs to promote the significance of the Complex to Rhode Island's herptofauna. Work with Friends of the Refuges and volunteers to identify opportunities to reduce amphibian and reptile road mortality during spring migration.
- By 2005, evaluate and incorporate recommendations (pending) made by Partners for Amphibian and Reptile Conservation (PARC) as warranted into refuge management.
- By 2005, implement an inventory and monitoring strategy for amphibians and reptiles on the Complex. (In cooperation with the University of RI, we have already begun inventories at Trustom Pond and Ninigret Refuges; we need to begin baseline inventories on Sachuest Point and Block Island Refuges.)

How will Refuge staff protect and manage rare plant habitats on the Rhode Island Refuge Complex?

Under the Proposed Action, our objective is to develop site-specific plans to protect, reestablish, and sustain rare plant habitats on Refuge lands. In addition to current management, actions would include:

- By 2004, develop, with partners, a site management plan for Ninigret Refuge rare plant sites, including the orchid and globally ranked shadbush sites. Plans would cover desired vegetation structure and composition, deer control treatments, proposed vegetative treatment methods (e.g. fire, mechanical, and chemical) and additional research needs.
- By 2005, develop, with partners, a management, inventory, and monitoring plan for the Trustom Pond Refuge sea pink and other rare plant sites.
- By 2006, survey and map other rare plant sites known for the Rhode Island Refuge Complex.
- By 2008, with the Service's New England Field Office, RI DEM, and other partners, assess the potential for establishing or restoring federal and state listed species such as seabeach amaranth, sandplain gerardia, bushy rockrose, New England blazing star, and other former candidate plant species with potential habitat on the Refuge Complex.

Issue 2: Restoration and maintenance of coastal sandplain natural communities, including grasslands

Where will Refuge staff restore early successional communities on the Rhode Island Refuge Complex?

Refuge staff are actively involved in restoring early successional grasslands and shrublands on several refuges. Under the Proposed Action our objective would be to manage each area to restore its native vegetative structure and composition and to maintain the natural physical components and processes associated with a coastal sandplain community, or maritime community on Sachuest Point Refuge. Since current habitat conditions are highly altered from historic conditions, continuous evaluation of project effectiveness and an adaptive management response would be imperative. With the acreage targeted, an additional objective would be to increase nesting habitat for bobolinks and eastern meadowlarks. Less likely, but very desirable, would be sustained nesting by upland sandpipers and grasshopper sparrows.

- By 2004, we would secure funding to complete restoration work on 220 contiguous acres on Ninigret Refuge, 125 acres on Trustom Pond Refuge, and 42 acres on Sachuest Point Refuge, as identified in Alternative A. Each project is discussed separately below. In addition, a maintenance and monitoring schedule would be developed for each project area.

Specific objectives for Ninigret Refuge would include:

- Convert 70 acres of asphalt runway to predominantly grasslands as outlined in the 1997 Environmental Assessment: Habitat Restoration Project, Ninigret National Wildlife Refuge. In addition, we would manipulate 150 acres of adjacent mid-seral mixed shrubland to create a mosaic of early successional habitat.
- By 2015, 85% of the 220 acre project area would be in an early successional, native coastal sandplain community with invasive plant species dominating less than 15% of the project area.

- Native coastal grassland plant species would include, but not be limited to: little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), common hairgrass (*Deshampsia flexuosa*), poverty-grass (*Danthonia spicata*), Pennsylvanian sedge (*Carex pennsylvanica*), rush (*Juncus greenei*), wild indigo (*Baptisia tinctoria*), native asters (*Aster spp*), goldenrods (*Solidago spp.*), butterfly weed (*Asclepias tuberosa*), and dewberry (*Rubus hispida* and *R. flagellaris*).
- Native shrub species would include, but not be limited to, such species as northern arrowwood (*Viburnum dentatum*), sumacs (*Rhus spp*), bayberry (*Myrica pennsylvanica*), high bush blueberry (*Vaccinium corymbosum*), and shadbush (*Amelanchier canadensis*).

Specific objectives for Trustom Pond Refuge would include:

- By 2015, maintain 85% of the 125 acre restoration project in early successional, native coastal sandplain habitat, with invasive species dominating less than 15% of the area. Target native species are the same as those identified above for Ninigret Refuge.

Specific objectives for Sachuest Point Refuge would include:

- By 2015, create early successional maritime grassland and shrubland habitat on the 42 acre project area with invasive species dominating less than 50% of the area and with native species established on over 50% of the area. On Sachuest Point Refuge the restoration work is more problematic due to the epidemic of invasive species.
- Maritime grassland species include, but are not limited to, such plants as field goldenrods (*Euthamia graminifolia* and *E. tenuifolia*), bitter milkwort (*Polygala polygama*), white-topped aster (*Asster paternus*), rush (*Juncus greenei*). Maritime shrubland species include, but are not limited to, such species as bayberry, sand rose (*Rosa rosgosa*), beach plum (*Prunus maritima*), wild rose (*Rosa virginiana*), shadbush, arrowwood, poison ivy (*Toxicodendron radicans*), eastern red cedar (*Juniperus virginiana*), and highbush blueberry.
- Also by 2004, develop and implement a plan to maintain an additional 40 acres (82 acres total) of early successional maritime grassland and shrubland habitat on Sachuest Point Refuge.

Other objectives for the Refuge Complex would include:

- By 2008, develop an early successional restoration plan for Chafee and Block Island Refuges.
- By 2010, evaluate restoration areas for their potential as regal fritillary butterfly reintroduction sites.

How will grassland restoration be implemented on the Rhode Island Refuge Complex?

Under the Proposed Action, our objective is to implement the most effective and efficient treatments for sustaining the vegetative structure and composition described above.

Actions would include the following:

- Treatments would be the same as proposed for Alternative A. These include the use of mechanical, prescribed fire, biological, and chemical herbicide treatments. Mechanical treatments include brushhogging or hydroaxing woody vegetation, and discing, harrowing, plowing, packing, and drilling grassland fields. All herbicides used are on an approved Service list, and their use on the Refuge is approved annually by the Regional Environmental Contaminants Specialist.

How will the Refuge Complex promote grassland restoration on private lands?

Native grasslands and grassland-dependent species are a concern because they are dramatically declining throughout the Northeast, especially large contiguous grasslands over 100 acres. The Refuge Complex offers relatively few areas on which to maintain large expanses of this habitat. As such, opportunities on private lands could provide an important contribution. Under the Proposed Action, our objective is to enhance Refuge restoration projects and contribute to regional conservation efforts by working with adjacent landowners.

To achieve this objective, we would:

- Continue with the private land cooperative grassland habitat work on 40 acres adjacent to Trustom Pond Refuge. Herbicide treatments, fertilizing, mowing, and some reseeding with a big bluestem-dominated mixture would occur for maintenance. These acres enhance the restoration work on the Refuge by creating a larger complex for those grassland dependent species that require more than 50 acres of contiguous habitat.
- By 2004, cooperate in the restoration of an additional 15 acres of farm field to a bluestem-dominated community adjacent to Trustom Pond using the same treatments described above.
- By 2005, establish native grassland demonstration areas on both Ninigret and Trustom Pond Refuges. We would also develop exhibits at the new Visitor Center, and conduct interpretive programs using volunteers and staff. In addition, we would maintain the grassland restoration interpretive sign at Ninigret Refuge trailhead as an outreach tool.
- By 2008, implement a “cooperative extension” outreach program and develop materials to provide technical support for interested landowners and conservation partners. The program may also include on-the-ground assistance.

Issue 3: Management of the beach strand ecological community

How will Refuge staff contribute to the protection and restoration of beach strand communities?

Beach strand (also known as barrier beach) is perhaps the most imperiled habitat type on or adjacent to the Refuges because of the combined impacts of development and recreation. Many species associated with this habitat type are either federal or state listed as threatened or endangered. Management of these areas is extremely complex and controversial, especially if restrictions on beach use occurs. Under the Proposed Action, our objective would be to promote stewardship of these areas throughout the South Shore, seek opportunities for new Refuge acquisition, and increase protection of beach strand habitats, where they occur on the Refuge Complex. Specific actions would include:

- Each year, evaluate any opportunities to acquire beach strand property from willing sellers in the South Shore Focus Areas. Beach strand habitat proximal to other undeveloped areas, or of a size and condition which allow us to maintain or restore biological integrity, will continue to be the highest acquisition priority.
- By 2002, in combination with piping plover outreach and education, initiate an intensive outreach and education campaign with the Friends of the Refuges and other partners to target beach front landowners, elected officials, and beach visitors, to promote increased protection and stewardship of beach strand habitat.
- By 2002, close Block Island Refuge beaches above the mean high tide line to vehicles from April 1 to September 15 to ensure protection of nesting and migratory shorebirds, and to reduce physical impacts to beaches and dunes.
- By 2003, use two seasonal park aides to implement the project.
- By 2004, cooperate with the Town of New Shoreham, Block Island Land Trust, Block Island Conservancy, and The Nature Conservancy to develop a cooperative resource protection and public use and access plan for the Block Island Focus Area. The Plan would establish limits on both pedestrian and vehicle use in an attempt to protect sensitive areas (shorebird and waterbird nesting areas and native dune vegetation) while also providing for public use. A permit system and/or designated access and travel ways should be evaluated. Implementation would require a formal cooperative agreement among all partners.

Issue 4: Management of Trustom Salt Pond

How should Trustom and Cards Ponds be managed to improve water quality and benefit species of concern?

Trustom Pond is considered by many to be the “crown jewel” of the Refuge Complex. Its incredible resource values to shorebirds and waterfowl are well known. However, Trustom Pond has not been evaluated from an ecosystem perspective; that is, understanding how the aquatic system functions and is influenced by the adjacent wetland and terrestrial communities.

Under the Proposed Action, our objective is to utilize local expertise to develop an ecosystem-based plan that sustains biological diversity, water quality, and other resource values of importance. In addition to actions proposed in Alternative A, we would:

- By 2005, work with partners to develop an integrated management plan for Trustom and Cards Salt Ponds. This plan would evaluate and prioritize management, monitoring and inventory efforts for waterfowl and shorebirds, including piping plover, anadromous fish, invasive plants and animals, submerged aquatic vegetation, and factors affecting water quality.

Issue 5: Protection and restoration of wetlands

How will Refuge staff restore and promote wetland ecosystems on the Rhode Island Refuge Complex?

Wetlands are another habitat type dramatically declining in area and quality in Rhode Island. Wetlands are lost permanently through development, while existing areas are degraded by pollutants and invasive plants. The Proposed Action would build on Alternative A with an objective to restore wetland ecosystems on the Refuge through invasive plant control, reestablishing natural hydrologic flow, and reducing pollution sources. Specific actions would include:

- Beginning in 2005, treat at least five acres of Phragmites and other invasive wetland plants on the Refuge Complex each year, using chemical, biological, mechanical or prescribed fire treatments as needed.
- By 2008, develop site plans and implement restoration of the following top wetland projects: 25 acres at Sachuest Point Refuge (Corps of Engineers project) and 70 acres at Ninigret Refuge. The Ninigret wetlands project includes treating Phragmites, restoring wetlands under runways, and attempting to restore as natural a hydrologic flow as possible to ditched and filled areas.
- By 2008, evaluate wetland restoration potential at Chafee Refuge.

Issue 6: Improving water quality in the Narrow River

How will Refuge staff contribute to improving and protecting the water quality of Pettaquamscutt Cove and the Narrow River Watershed?

The Narrow River, including Pettaquamscutt Cove, is an incredibly important natural resource benefitting both wildlife and people in the South County area. Unfortunately, water quality continues to fall below state standards with development and recreational pressures remaining high. Because areas below mean high tide are outside the jurisdiction of the Service, the Refuge has little direct influence. Under the Proposed Action our objective is to work in partnership to promote stewardship of the area and identify and reduce pollution sources. Specific actions would include:

- By 2005, work with RI DEM, RI CRMC, and the Towns of Narragansett and South Kingstown to create a “no wake” zone in Pettaquamscutt Cove and the lower Narrow River to reduce erosion and destruction of salt marshes on the Refuge.

- By 2005, work toward watershed-based solutions to the water quality problems impacting the Narrow River. We would become actively involved in an interagency partnership (yet to be established), as recommended in RI CRMC's Narrow River Special Area Management Plan. This interagency working group would be organized to develop a comprehensive plan for the Narrow River watershed and to set research and management priorities.
- Also by 2005, Refuge staff would become involved in the South County Watershed Partnership to promote protection and stewardship of watersheds influencing the Refuges.

Issue 7: Control of invasive, non-native, or overabundant plant and wildlife species

How will Refuge staff control non-native and/or invasive plant species on the Refuge Complex?

Each of the Refuges has an extensive distribution of non-native, invasive plant species severely impacting our ability to maintain native biodiversity. Under the Proposed Action, our objective is to increase treatment to cover at least 25 acres/year, eliminate new invasions, and control the spread of already established non-native, invasive plants. Actions would include:

- By 2004, identify and map current distribution of non-native, invasive plant species on each Refuge.
- By 2005, prioritize treatment sites to prevent new invasions or eradicate recently established plants. Also of high priority are threatened, endangered, or rare plant sites or "pristine rare and exemplary vegetative communities" (March 1999 Invasive Plant Control Initiative, Strategic Plan for the Connecticut River Watershed/Long Island Sound).
- By 2005, establish a program to treat at least 25 acres/year of invasive, non-native species, including at least five acres of wetlands plants, using chemical, mechanical, prescribed fire and biological treatments as necessary. Strategies would be adapted based on monitoring and new information. A maintenance worker would be hired to administer treatments.

How will Refuge staff manage non-native, invasive mute swan on the Rhode Island Refuge Complex to reduce adverse effects on waterfowl and water quality?

Mute swan also impact our ability to maintain native biodiversity as they aggressively drive native waterfowl and shorebirds away from nesting sites, and compete with them for food. Under the Proposed Action, our objective is to eliminate mute swan from the Refuge Complex, with particular emphasis on eliminating nesting activity.

- By 2001, we would implement the Service's policy (Memo FWS/MBMO/98-00043; based on Flyway Council recommendations) to prevent the establishment of, or to eliminate, mute swans. Strategies would be adapted as needed to pursue zero productivity of mute swans on the Refuge Complex. Each year, addling eggs would continue. Adult populations would be controlled using lethal and non-lethal techniques, if warranted, when habitat degradation is a concern or numbers become excessive.

How will Refuge staff manage deer populations within and adjacent to the Refuge Complex?

Excessive deer numbers are a concern when they degrade habitat or increase risks to human health and safety through increased vehicle collisions and incidences of Lyme disease. Since deer are highly mobile, it is difficult to effectively control a population unless they are managed throughout most or all of their range. The Refuge has not closely monitored deer populations, their movements, or impacts to habitats, nor have we established thresholds beyond which active management of deer populations should occur. Under the Proposed Action, our objective is to work with RI DEM and adjacent landowners to establish a coordinated management strategy for areas including and surrounding the Refuges.

- By 2002, we would cooperate with RI DEM, adjacent landowners, and other Block Island partners to develop a deer management plan for the Block Island Focus Area. The Plan would identify habitat objectives as well as public health and safety objectives, and would establish the need to control deer populations if stated objectives are not being reached (e.g. excessive browse line, impacts to rare plants, increasing Lyme-disease-bearing deer ticks or increased incidence of Lyme disease, increased deer-vehicle collisions, etc.)
- By 2003, we would cooperate with RI DEM, adjacent landowners, and the Town of Charlestown to develop a deer management plan for an area including and surrounding Ninigret Refuge.
- By 2004, we would cooperate with RI DEM, adjacent landowners, and Town of Narragansett to develop a deer management plan for the area including and surrounding the Foddering Farms parcel on Chafee Refuge.
- By 2006, we would cooperate with RI DEM and Town of South Kingstown to develop a deer management plan for the area including and surrounding Trustom Pond Refuge.
- We will evaluate deer hunting as a management tool on any refuge, if its deer management plan recommends reducing the deer population, since it would also promote a priority public use. A separate EA, including public involvement, is required before opening any refuge to deer hunting.

Issue 8: New Refuge Complex land acquisition and cooperative protection of sensitive habitat sites.

How will we expand our land acquisition program to protect species and habitats of special concern?

Acquiring important habitat from willing sellers is one of the most effective ways the Service can contribute to sustaining ecological integrity and conserving rare and declining species. Under the Proposed Action, our objective is to protect, through acquisition, an additional 3,200 acres. Specific actions include:

- By 2001, with partners, increase cooperative land protection and acquisition from willing sellers in Level 1 Focus Areas on the South Shore and on Block Island (See “Developing Land Protection Strategies,” above).
- Determine at the time we acquire it whether any new acquisition warrants designation as a new refuge. Nothing in this draft CCP/EA precludes establishing a new refuge.
- By 2004, develop with partners a cooperative resource protection and public use and access plan for the entire Block Island Focus Area (also see Issue 3).

Issue 9: Access to credible natural resource information on the Refuge Complex to ensure management decisions are based on the best available science

How will Refuge staff establish needs for and begin to collect baseline biological information across the Rhode Island Refuge Complex?

While the Proposed Action targets management for certain species and plant communities, we also need to improve our general knowledge base of other Refuge resources and the interactions sustaining biological diversity and ecosystem health. Under the Proposed Action, our objective is to prioritize our information needs and establish a schedule for collecting the information.

Specific actions would include:

- By 2003, we would have a priority list of baseline biological inventory needs to better understand and document the biodiversity on the Refuge Complex. One priority would be to identify the presence and distribution of species and habitat types listed in Appendix A. Also, it would be a priority to survey the aquatic resources in Trustom Pond.
- By 2004, we would begin inventories on the highest priority projects, incorporating the CENSUS database or other regional databases with GIS capabilities to facilitate future analyses.

How will Refuge staff insure that biological integrity of natural communities will be maintained on the Rhode Island Refuge Complex?

The Proposed Action includes management actions and strategies for certain habitats and species which would be further refined in a Refuge Complex Habitat Management Plan. The objective of the Habitat Management Plan would be to prevent the loss or degradation of habitat types, species assemblages, or natural processes significant to the Complex. It would identify actions that, to the extent practicable, restore and sustain viable populations of species dependent on priority habitats. Specifically we would:

- By 2003, develop a Refuge Complex Habitat Management Plan which is our highest priority step-down plan to complete. The Plan would incorporate relevant Service policies. Also by 2003, develop a Monitoring and Inventory Plan to support habitat and species priorities.
- The plan would define the full array of physical habitats on the Complex, evaluate their condition, and determine their context and significance within the greater ecosystem. The plan would also prioritize habitat management on the Complex according to these habitat types.

Issue 10: Management of public use and access (except hunting and environmental education which are presented separately)

How will we improve Visitor Services?

A coordinated strategy for implementing a high quality visitor services program is currently lacking on the Refuge. Under the Proposed Action our objective is to develop a Refuge Complex Visitor Services Plan by 2004, which would accomplish the following :

- Establish strategic goals and priorities for Visitor Services across the Refuge Complex;
- Identify target audiences and partnership opportunities for each Refuge;
- Establish a methodology for determining visitor numbers, capacity limits, limits on visitor impacts to wildlife and habitats, and a means for assessing quality of visitor experiences;
- Evaluate recreational fee opportunities; and
- Establish an implementation schedule for priority Visitor Service's projects.

In addition to the plan:

- By 2004, we would hire at least two additional Outdoor Recreation Planners to help write and implement the Plan.

How will Refuge staff improve existing partnerships with groups involved in or influencing public use activities on the Refuges?

Partnerships are vital for public support and management of public use activities. Under the Proposed Action, our objective is to formalize our existing partnerships to promote coordinated management and facilitate sharing of resources.

- By 2005, we would develop formal agreements with current partners, such as the South County Museum, Norman Bird Sanctuary, South County Tourism Council, to identify mutual goals, cost sharing, technical exchange, and environmental education and interpretation opportunities.

What fishing opportunities will be available at Block Island Refuge?

Under the Proposed Action, our objective is to provide a compatible, high quality fishing experience on Block Island Refuge, while reducing impacts to natural resources.

- By 2002, we would close Refuge beaches above the mean high tide line to vehicles from April 1 to September 15 to protect nesting and migrating shorebirds and reduce physical impacts to beach and dunes. Other than the vehicle restriction, the Refuge would remain open to surf fishing year round.
- By 2004, we would work with the Town of New Shoreham, The Nature Conservancy, and other partners to develop a cooperative resource protection and public use and access plan for the Block Island Focus Area. The plan would establish limits on both pedestrian and vehicle use, attempting to protect sensitive areas (shorebird and waterbird nesting areas and vegetation), while also providing for public use. A permit system and/or designated access and travel ways would also be evaluated.
- By 2005, we would implement a monitoring plan in vicinity of the colonial waterbird rookery to evaluate disturbance by surf fishing. If necessary, public access would be adapted in response to monitoring results.

What fishing opportunities will be available at Ninigret Refuge?

Under the Proposed Action, our objective is to provide a compatible, high quality fishing experience on Ninigret Refuge, while reducing impacts to natural resources. Actions would include:

- By 2003, designate and maintain access trails for shoreline fishing at Ninigret Pond to minimize impacts on habitat. Actively enforce use of trails.
- By 2003, require commercial shell fishermen to have a Refuge special use permits, to allow us to better document use and impacts.

What fishing opportunities will be available at Chafee Refuge?

Under the Proposed Action, our objective is to provide a compatible, high quality fishing experience on Chafee Refuge, while reducing impacts to natural resources.

- We would continue to allow fishing from boats and the shoreline, but, by 2005, trail access would be designated to reduce impacts to marsh.
- By 2007, we would construct at least one barrier-free, accessible fishing structure.

What fishing opportunities will be available at Sachuest Point Refuge?

Under the Proposed Action, our objective is to provide a compatible, high quality fishing experience on Sachuest Point Refuge, while reducing impacts to natural resources. Actions would include:

- By 2002, designate access points to the shoreline to minimize erosion and to better enforce Refuge regulations against littering and bonfires. In addition, we would initiate a study to evaluate impacts to wildlife from night fishing. Of particular concern is the potential impact from the large lanterns or spotlights kept lit while fishing at night.

- Also by 2002, we would develop and enforce a regulation requiring spear-fishing gear to be unloaded and encased while on Refuge land to avoid intimidating other Refuge visitors and to ensure their safety.

What fishing opportunities will be available at Trustom Pond Refuge?

Same as Alternative A.

What kind of interpretive opportunities will be available at Block Island Refuge?

Under the Proposed Action our objective is to increase opportunities for a compatible, high quality interpretive experience on Block Island Refuge.

- By 2005, we would develop an interpretive program for Block Island Focus Area tiered to the Visitor Services Plan. The plan would evaluate opportunities for interpretive exhibits at Crescent Beach, North Light, on the ferry, at the ferry landing, at town center, at Settler's Rock, or at the "welcome center" in the town theater. We would also consider cooperating with The Nature Conservancy on an interpretive walk along Clayhead Bluffs trail.

What kind of interpretive opportunities will be available at Ninigret Refuge?

Under the Proposed Action, our objective is to increase opportunities for a compatible, high quality interpretive experience on Ninigret Refuge. In addition to current management, we would implement the following:

- By 2005, develop an interpretive program tiered to the Visitor Services Plan. Evaluate needs for new pamphlets, including a self-guided interpretive pamphlet, trail maps, and interpretive signs at the current and proposed (Foster Cove) barrier free observation platforms.

What kind of interpretive opportunities will be available at Chafee Refuge?

Under the Proposed Action, our objective is to establish opportunities for compatible, high quality interpretive experiences on Chafee Refuge. Actions would include:

- By 2003, ensure that RI DOT constructs interpretive kiosk on Refuge along South County Bike Trail according to Refuge stipulations.
- By 2005, develop an interpretive program for the Refuge tiered to the Visitor Services Plan. Evaluate the opportunities to cooperate on an interpretive exhibit and kiosk at South County Museum and construct a kiosk and pullout at Middle Bridge.
- Evaluate opportunities for constructing a kiosk and barrier-free trail and observation platform at Bridgeport Commons, and designating interpretive canoe and kayak routes. We would also consider guided trips using a concessionaire.

What kind of interpretive opportunities will be available at Sachuest Point Refuge?

Under the Proposed Action, our objective is to increase opportunities for a compatible, high quality interpretive experience on Sachuest Point Refuge. In addition to current management, we would implement the following:

- By 2004, complete renovation of Visitor Center and exhibitry.
- By 2005, develop an interpretive program tiered to the Visitor Services Plan, including development of an interpretive trail describing the natural and cultural history of the area. At least one trail would be reconstructed to allow for barrier-free accessibility. We would also develop additional interpretive kiosks and demonstration areas, improve signage, create a watchable wildlife pamphlet, and provide multi-lingual literature.
- By 2008, coordinate with the Town of Middletown to develop interpretive signs, kiosks, and/or exhibits on Second and Third beaches, and an exhibit at Newport Visitor Center.

What kind of interpretive opportunities will be available at Trustom Pond Refuge?

Under the Proposed Action, our objective is to increase opportunities for a compatible, high quality interpretive experience on Trustom Pond Refuge. In addition to current management we would implement the following actions:

- By 2005, develop an interpretive program tiered to the Visitor Services Plan.
- Also by 2005, construct a barrier-free trail to Trustom Pond with self-guided trail literature, and construct interpretive signs for the grassland restoration project, barrier beach, and salt pond ecology.

What kind of wildlife observation and photography opportunities will be available at Block Island Refuge?

Under the Proposed Action, our objective is to increase opportunities for a compatible, high quality wildlife observation and photography experience on Block Island Refuge. We would implement the following:

- By 2005, formerly “open” all of the Refuge to wildlife observation and photography in conjunction with the cooperative resource protection and public use and access plan for the Block Island Focus Area. Travelways would be designated. We would continue to restrict access if piping plover are observed showing territorial behavior, and continue to restrict access seasonally in sensitive areas such as Beane Point. All proposed activities on Beane Point would occur outside of the sensitive nesting period for wading birds, approximately May 1 to August 1.
- Also by 2005, hire a seasonal park aid to provide guided walks outside of sensitive shorebird and wading bird nesting and migration seasons.

What kind of wildlife observation and photography opportunities will be available at Ninigret Refuge?

Under the Proposed Action, our objective is to increase opportunities for a compatible, high quality wildlife observation and photography experience on Ninigret Refuge. In addition to current management we would implement the following:

- By 2003, secure funding to complete construction of the 3.8 mile “Trail Through Time” and construction of a new observation platform on Ninigret Pond at Foster Cove. This new trail amounts to a reduction from the original 8.0 miles, mostly comprised of asphalt runway. Public access would be restricted to designated trails and shoreline access points.
- By 2005, if determined feasible, construct up to two additional barrier-free observation platforms and/or viewing blinds at the grassland restoration project area and/or on Ninigret Pond.
- We would also develop watchable wildlife literature and a species checklist.

What kind of wildlife observation and photography opportunities will be available at Chafee Refuge?

Under the Proposed Action, our objective is to establish opportunities for compatible, high quality wildlife observation and photography experiences on Chafee Refuge.

- By 2005, we would cooperate with the Town of Narragansett, adjacent landowners, and RI DOT to construct a barrier-free accessible observation trail and platform at Middle Bridge. A second barrier-free trail and platform would be constructed at Bridgeport Commons. We would also designate an interpretive kayak/canoe trail.

What kind of wildlife observation and photography opportunities will be available at Sachuest Point Refuge?

Under the Proposed Action, our objective is to improve opportunities for a compatible, high quality wildlife observation and photography experience on Sachuest Point Refuge, while minimizing impacts to natural resources. In addition to current management, we would implement the following:

- By 2004, modify or eliminate unnecessary and redundant trails or trails likely to impact future habitat restoration project areas. Shoreline access points would also be designated and enforced to minimize erosion. Access would be restricted to designated trails.
- By 2008, reconstruct one trail to provide barrier-free access to an observation platform. We would also develop watchable wildlife pamphlets and species’ checklists.

What kind of wildlife observation and photography opportunities will be available at Trustom Pond Refuge?

Under the Proposed Action, our objective is to improve opportunities for a compatible, high quality wildlife observation and photography experience on Trustom Pond Refuge, while minimizing impacts to natural resources. In addition to current management, we would implement the following:

- By 2003, we would eliminate unnecessary, redundant trails and restrict public use to trails only.
- By 2005, we would reconstruct the eastern-most trail to make it barrier-free accessible. At least one existing platform accessed by this trail would be made barrier free. We would also develop a watchable wildlife pamphlet and species checklist.
- By 2008, we would evaluate opportunities to construct two barrier free photo blinds.

How will nonwildlife dependent activities be managed at Block Island Refuge?

Nonwildlife dependent, incompatible activities are affecting the quality of experience for other Refuge visitors. They often degrade habitat quality and directly impact species of concern. In short, these activities detract from fulfillment of Refuge purposes. Under the Proposed Action, our objective is to eliminate existing nonwildlife dependent, inappropriate or incompatible activities by 2005. Specific actions would include:

- By 2002, increase resource protection and management of public use by hiring a seasonal law enforcement officer to work between Block Island and Sachuest Point Refuges. Enforce restrictions on incompatible and nonwildlife-dependent uses or other public use concerns identified in the cooperative plan for the Block Island Focus Area (see Issue 2). This includes the annual seasonal closure on ORV's from April 1 to September 15.
- By 2005, eliminate all inappropriate, incompatible, or nonwildlife-dependent activities specifically targeting ORV recreational driving, dog walking, swimming and sunbathing, jogging, and kite flying.
- By 2005, develop a cooperative agreement with Town of New Shoreham to share law enforcement responsibilities.

How will nonwildlife dependent activities be managed at Ninigret Refuge?

As stated above for Block Island, nonwildlife dependent, incompatible activities detract from our ability to fulfill Refuge purposes. Under the Proposed Action, our objective is to eliminate these activities from the Refuge by 2005. Certain activities are targeted sooner.

- By 2001, we would implement an outreach and education program to begin to phase out dog-walking and bicycling. These activities were previously allowed by Refuge staff on the existing runways with a decision in 1997 (Habitat Restoration Project EA: Ninigret Refuge) that these uses would be eliminated once the runways were removed.

- By 2003, an additional seasonal law enforcement officer would be hired to provide more consistent, thorough outreach and enforcement to deal with incompatible activities.
- By 2005, we would eliminate all inappropriate, incompatible, and/or nonwildlife dependent activities specifically targeting bike riding, roller blading, dog walking, jogging, kite flying, ORV use, swimming, and sunbathing.

How will nonwildlife dependent activities be managed at Chafee Refuge?

As stated above for Block Island, nonwildlife dependent, incompatible activities detract from our ability to fulfill Refuge purposes. Under the Proposed Action, our objective is to eliminate these activities from the Refuge by 2005.

Actions would include:

- By 2005, finish posting all Refuge boundaries. We would also develop and implement a strategy to consolidate shoreline access easement of adjacent landowners.
- Also by 2005, we would attempt to minimize the impacts from off-Refuge recreational water activities by working with RI DEM to create a “no wake zone” in Pettaquamscutt Cove and the Lower Narrow River. The purpose of this action is to reduce the rate of erosion to shoreline and salt marshes and minimize the disturbance to Refuge wildlife from these activities.
- By 2005, increase monitoring and enforcement against unauthorized access across the Refuge.

How will nonwildlife dependent activities be managed at Sachuest Point Refuge?

As stated above for Block Island, non-wildlife dependent, incompatible activities detract from our ability to fulfill Refuge purposes. Under the Proposed Action, our objective is to eliminate these activities from the Refuge by 2005. Certain activities are targeted sooner.

- Beginning in 2001, we would initiate an intensive outreach and education effort to begin to phase out dog walking and jogging on the Refuge.
- By 2002, we would establish a consistent Service presence by assigning permanent staff to this station and by staffing the Visitor Center.
- By 2003, we would increase resource protection and management of public use by utilizing law enforcement personnel to provide more consistent and thorough outreach and enforcement of incompatible, nonwildlife dependent activities.
- By 2005, we would eliminate all inappropriate, incompatible, and/or nonwildlife dependent activities specifically targeting jogging, dog walking, swimming, sunbathing, bicycling, horseback riding, and bonfires.

How will nonwildlife dependent activities be managed at Trustom Pond Refuge?

As stated above for Block Island, nonwildlife dependent, incompatible activities detract from our ability to fulfill Refuge purposes. Under the Proposed Action, our objective would be to eliminate these activities from the Refuge by 2005. Certain activities are targeted sooner.

- By 2004, we would increase resource protection and management of public use by utilizing law enforcement personnel to provide more consistent and thorough outreach and enforcement of incompatible, nonwildlife dependent activities. Law enforcement efforts would continue to focus on keeping people and dogs out of the Moonstone Beach piping plover closure area and on enforcing against inappropriate behavior on beaches, parking areas, and trails.
- By 2005, we would eliminate all inappropriate, incompatible and/or nonwildlife dependent activities specifically targeting swimming and sunbathing, bike riding, horseback riding, ORV use, and kite flying.

What priority public uses would be allowed on newly acquired Refuge lands?

Under the Proposed Action, our objective is to allow priority public uses to continue on an interim basis on newly acquired Refuge lands, unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination in Appendix E.

- These interim compatibility determinations would be in effect until formal compatibility determinations are completed.
- Before any new wildlife-dependent activity is allowed, a compatibility determination would be required. In addition, opening up newly acquired lands to hunting and fishing require notification in the Federal Register. Hunting programs also require preparation of an EA and an Annual Hunt Plan.
- All nonwildlife dependent activities existing on newly acquired Refuge lands would be phased out as soon as practicable.

How will the Refuge promote and cultivate the relationship with the Friends of the National Wildlife Refuges of Rhode Island?

Our partnership with the Friends Group is vitally important to us for community relations and for support in implementing our resource programs. Under the Proposed Action, our objective is to build on current management and strengthen our relationship with the Friends Group.

- By 2001, we would conduct at least semi-annual meetings with the Friends Group to promote communication and evaluate implementation of the MOU. We would continue to actively support and promote the Friends Group's vital efforts in funding and implementing outreach and environmental education programs which enhance our ability to meet Refuge goals.

Issue 11: Hunting on the Refuges

What hunting opportunities will be available at Block Island Refuge?

Neither past nor current Refuge management has promoted a hunting program for several reasons (see discussion under Alternative A, Issue 11). Under the Proposed Action, we would not propose hunting on Block Island Refuge. We would consider deer hunts in the future to control overabundant populations (see discussion under Alternative B, Issue 7).

What hunting opportunities will be available at Ninigret Refuge?

Under the Proposed Action, our objective is to slightly increase waterfowl hunting opportunities on Ninigret Refuge as outlined below. We would consider deer hunts in the future to control overabundant populations (see discussion under Alternative B, Issue 7).

Actions would include:

- By 2002, allow waterfowl hunting from boat only in Coon Cove and in the marshland within the barrier beach parcel. Arguably, this is not a significant expansion of hunting opportunity, as Coon Cove would probably only accommodate one party at a time. The hunt would be cooperatively administered with RI DEM under Refuge regulations. No other hunting season is proposed at this time for Ninigret Refuge.

What hunting opportunities will be available at Chafee Refuge?

Neither past nor current Refuge management has promoted a hunting program for several reasons (see discussion under Alternative A, Issue 11). Under the Proposed Action, we would not propose hunting on Chafee Refuge. We would consider deer hunts in the future to control overabundant populations (see discussion under Alternative B, Issue 7).

What hunting opportunities will be available at Sachuest Point Refuge?

Neither past nor current Refuge management has promoted a hunting program for several reasons (see discussion under Alternative A, Issue 11). Under the Proposed Action we would not propose hunting on Sachuest Point Refuge primarily because the impenetrable shrub vegetation and lack of a huntable wildlife population precludes a quality hunt program.

What hunting opportunities will be available at Trustom Pond Refuge?

Under the Proposed Action, our objective is to maintain the limited hunting opportunity on Trustom Pond Refuge, as outlined below. We would consider deer hunts in the future to control overabundant populations (see discussion under Alternative B, Issue 7).

- Each year, we would continue to allow RI DEM to administer a waterfowl hunt on 20 upland acres. Habitat management to promote this hunting opportunity would occur as outlined in a 1999 habitat management plan completed by RI DEM for this 20 acre tract. The plan would be annually reviewed and strategies updated as needed. No other hunting on Trustom Pond Refuge is proposed as this time.

Issue 12: Increased opportunities for environmental education

What curriculum-based environmental education opportunities will be available at Block Island Refuge?

Under the Proposed Action our objective is to increase opportunities for compatible, high quality environmental educational experiences on Block Island Refuge. In addition to current management we would implement the following:

- By 2003, initiate a formal partnership with The Nature Conservancy to facilitate sharing of resources and assist in curriculum development and implementation. A seasonal Park Aid would be hired for assistance. Beane Point would be used as a classroom laboratory or housing for educators and researchers.
- All proposed environmental education activities in the vicinity of Beane Point would occur outside of the sensitive nesting period for wading birds, approximately May 1 to August 1.

What curriculum-based environmental education opportunities will be available at Ninigret Refuge?

Under the Proposed Action, our objective is to increase opportunities for compatible, high quality environmental educational experiences on Ninigret Refuge. In addition to current management, we would implement the following:

- By 2002, sponsor a “Teach the Teacher” workshop as an effective way to reach many students to advocate protection and stewardship of natural resources.
- By 2004, update the existing MOA with Frosty Drew to insure compatibility with the Visitor Services Plan. The for-profit program currently operating on the Refuge would be evaluated for its compatibility with other environmental education programs. If determined compatible, the for-profit group would be required to obtain a Refuge special use permit.

- By 2005, with partners, develop an environmental education program tiered to the Visitor Services Plan. We would establish outdoor classroom sites featuring grassland restoration and salt pond ecology. We would pursue a volunteer environmental education corps to help with implementation on both Ninigret and Trustom Pond Refuges.

What curriculum-based environmental education opportunities will be available at Chafee Refuge?

Under the Proposed Action, our objective is to establish opportunities for compatible, high quality environmental educational experiences on Chafee Refuge.

- By 2004, we would sponsor a “Teach the Teacher” workshop.
- By 2005, we would cooperate with local schools and partners to develop a curriculum for classroom use featuring the Narrow River estuary and Pettaquamscutt Cove. We would develop a formal partnership with South County Museum to conduct curriculum based programs.

What curriculum-based environmental education opportunities will be available at Sachuest Point Refuge?

Under the Proposed Action our objective would be to increase opportunities for compatible, high quality environmental educational experiences on Sachuest Point Refuge. In addition to current management, we would implement the following:

- By 2003, sponsor a “Teach the Teacher” workshop.
- By 2005, develop a formal partnership with the Norman Bird Sanctuary to facilitate sharing of resources.
- Also by 2005, cooperate with towns of Middletown and Newport and local schools to develop curriculum based program featuring Refuge resources. A volunteer environmental education corps would be established to help implement programs.

What curriculum-based environmental education opportunities will be available at Trustom Pond Refuge?

Under the Proposed Action, our objective is to increase opportunities for compatible, high quality environmental educational experiences on Trustom Pond Refuge. In addition to current management we would implement the following:

- By 2002, sponsor a “Teach the Teacher” workshop.
- By 2005, with partners, develop an environmental education program tiered to the Visitor Services plan. We would work with local schools to develop a curriculum associated with the existing outdoor farm pond and barrier beach classroom sites. We would also improve outdoor classroom facilities.
- We would hire an additional Outdoor Recreation Planner to develop and implement programs across the Refuge Complex.

- By 2010, we would develop other curriculum-based, outdoor programs featuring coastal salt pond and grassland restoration. A volunteer environmental education corps, to be shared with Ninigret Refuge, would help with implementation.

Issue 13: Ability to provide staffing, operations, and maintenance support needed to accomplish goals and objectives

How does the proposed alternative change the funding requirements of the Rhode Island Refuge Complex?

Successful implementation of the Proposed Action relies on the ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Under the Proposed Action, our objective is to obtain the funding as outlined below:

- By 2003, funding would increase substantially, commensurate with the staffing and project lists outlined for Alternative B in Appendix F and Appendix H. Full implementation of this alternative would require an annual increase of \$569,000 for salary, and a total increase of \$10.3 million in RONS projects (not including recurring costs).

What will be the staffing needs of the Rhode Island Refuge Complex?

Successful implementation of the Proposed Action relies on the ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Under the Proposed Action, our objective is to obtain the staffing level outlined below:

- 26 full time personnel, and
- 17 seasonals
- Some staff would be assigned to Sachuest Point and Block Island Refuges as depicted on the staffing charts (Appendix H), the rest would be stationed at the current office pending completion of the new Refuge Complex Headquarters/Visitor Center.
- New positions emphasize an increase in visitor services, biological expertise, and visibility of the Service on Refuge lands.

How will the Service ensure protection of cultural resources on the Rhode Island Refuge Complex?

Under the Proposed Action, our objective is to develop and implement a cultural resources management and protection plan that meets federal and state requirements and increases public awareness and stewardship of these resources. Specific actions include:

- By 2005, increase the available data on cultural resources, to afford better protection, by initiating a cultural resources overview of the Refuge Complex.
- Conduct field investigations of Ninigret and Trustom Pond Refuges as these Refuges have the greatest likelihood of finding cultural resources with any integrity.
- Record all sites in a GIS data base.

- Train at least one law enforcement officer on the Refuge in regulations associated with the Archeological Resources Protection Act (ARPA).
- Also by 2005, develop a partnership agreement with the Narragansett Indian Tribal Council to facilitate cooperation on environmental education and interpretation, to improve our understanding of the context for these resources, and to increase site identification and protection.
- By 2010, develop a Cultural Resources Protection Plan for recorded sites.

Issue 14: Increased visibility of the U.S. Fish & Wildlife Service

How will the Refuge increase Service visibility and recognition of the National Wildlife Refuge System?

Visibility and recognition of the Service, the National Wildlife Refuge System, and the Rhode Island Refuge Complex are extremely important for gaining support to achieve our vision and goals. Under the Proposed Action, our objective is to increase visibility and recognition through the following actions:

- By 2005, complete construction of the new Visitor Center and Headquarters and reconstruction of the Visitor Center for Sachuest Point Refuge. In both visitor centers, we would provide exhibits which tie the Rhode Island Refuge Complex to the national system. Both Visitor Centers would increase the Service's visibility within local communities through outreach, education and interpretive programs.
- By 2008, complete boundary posting on Chafee Refuge and boundary posting on any new acquisitions on other Refuges. On an annual basis, we would replace and maintain boundary posts as necessary to insure visibility of Refuge lands.

Issue 15: Need for improved facilities

What facilities are needed to improve administrative and visitor contact services on the Rhode Island Refuge Complex?

Successful implementation of the Proposed Action relies on our ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Under the Proposed Action, our objective is to obtain visitor contact and administrative facilities as outlined below:

- By 2005, we would complete construction of the Visitor Center/Headquarters for the Refuge Complex. We would implement recommendations for interior facility design from the August 1999 Project Identification Document for the Refuge Complex Visitor Center. At least one Visitor Services Specialist would be hired to administer the new facility.
- By 2008, we would construct a visitor contact facility on Ninigret Refuge. At least one seasonal Park Aid would be utilized to help manage visitor contact stations and assist in the Visitor Center.

When will the Rhode Island Refuge Complex improve road and entry signs to meet national standards and better serve visitors?

As stated above, visibility and recognition of the Refuge Complex improve our chances of gaining local support for our vision, goals, and resource programs. Under the Proposed Action, our objective is to meet national standards for our signs. Specific actions include:

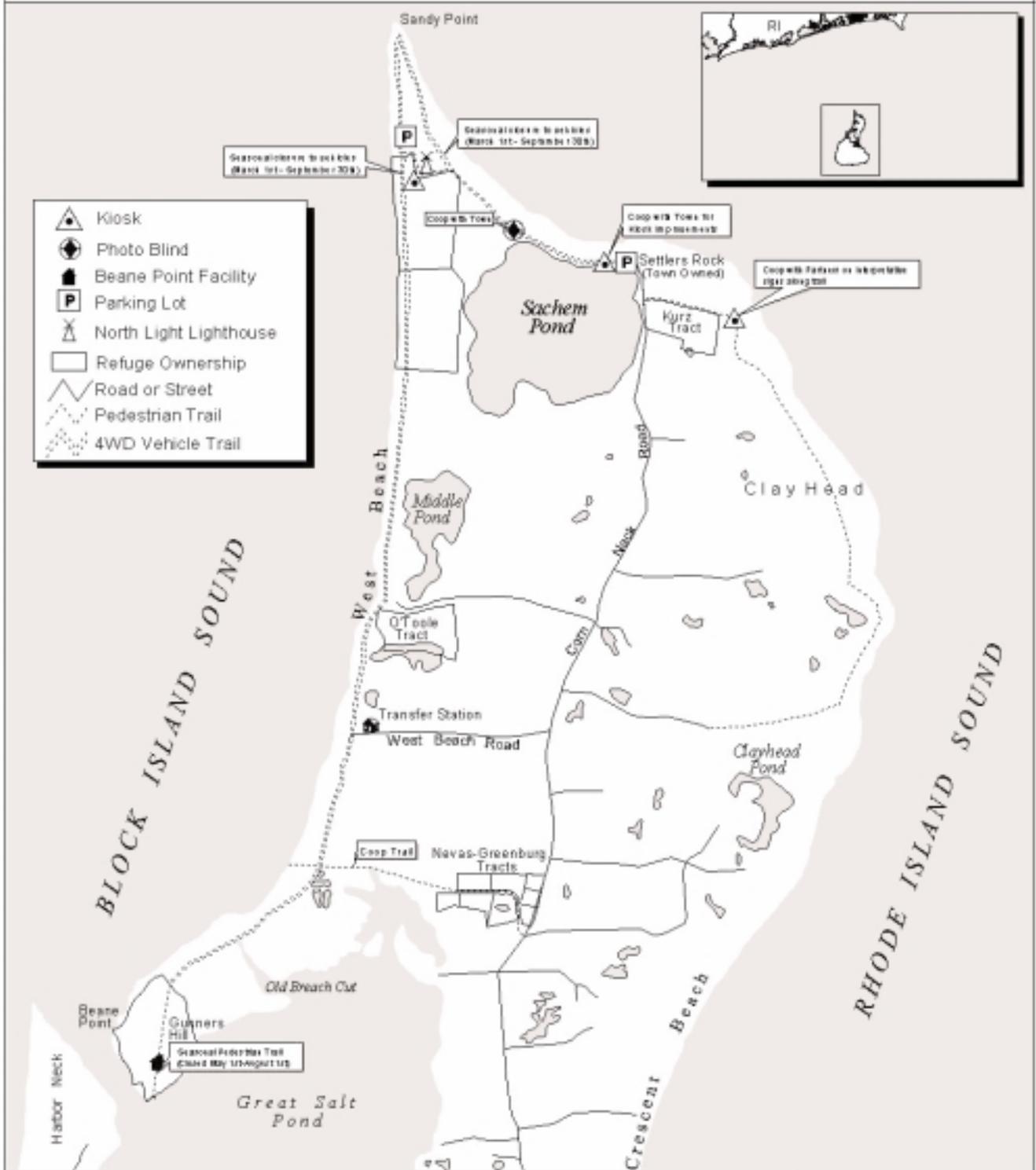
- By 2003, meet with RI DOT to modify existing U.S. Route 1 directional signs. At a minimum, propose changes to the existing sign directing visitors "To Moonstone Beach," and directional signs to Ninigret Refuge which are confused with Ninigret Park.
- By 2005, we would complete a Refuge Complex Facilities and Sign Plan.
- At a minimum, by 2005, the new Headquarters and Ninigret Refuge signs (on U.S. Route 1) should meet national standards.

Alternative B: Proposed Action

Proposed Public Use/Habitat Improvement

Block Island National Wildlife Refuge

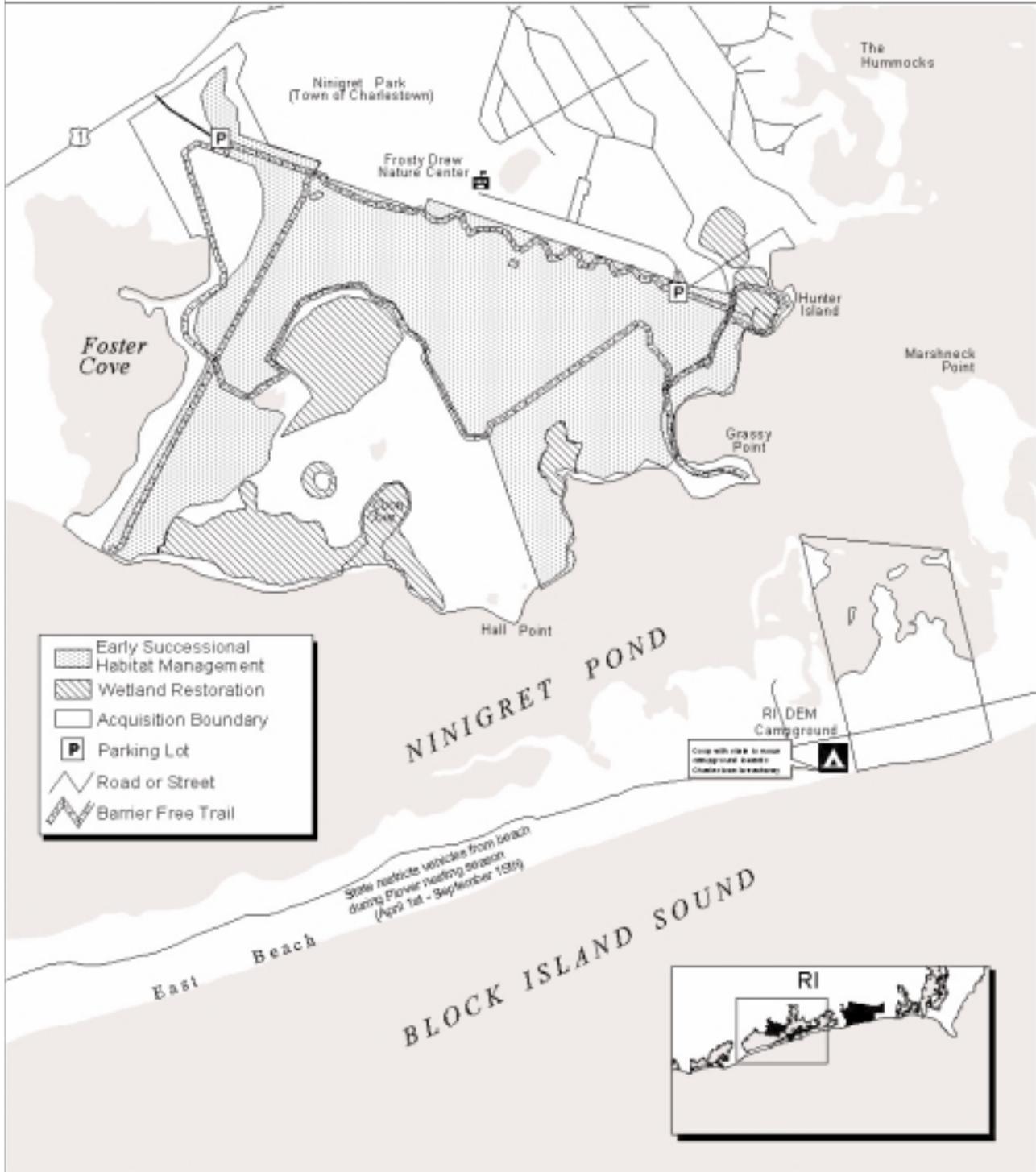
Rhode Island NWR Complex Comprehensive Conservation Plan



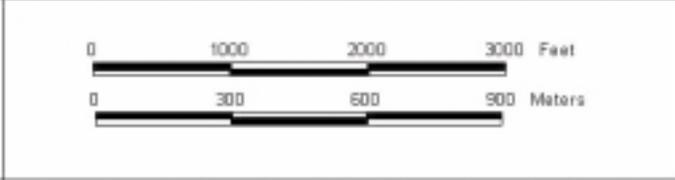
Data Sources:
 1999 & 1998 Road & Hydrography
 All other data provided by USFWS, RI RD
 & Co. New England RY Right Coast Frogok.
 Map prepared for Block Island NWR Complex
 Comprehensive Conservation Plan
 December 2000
 Not to be used for legal purposes.



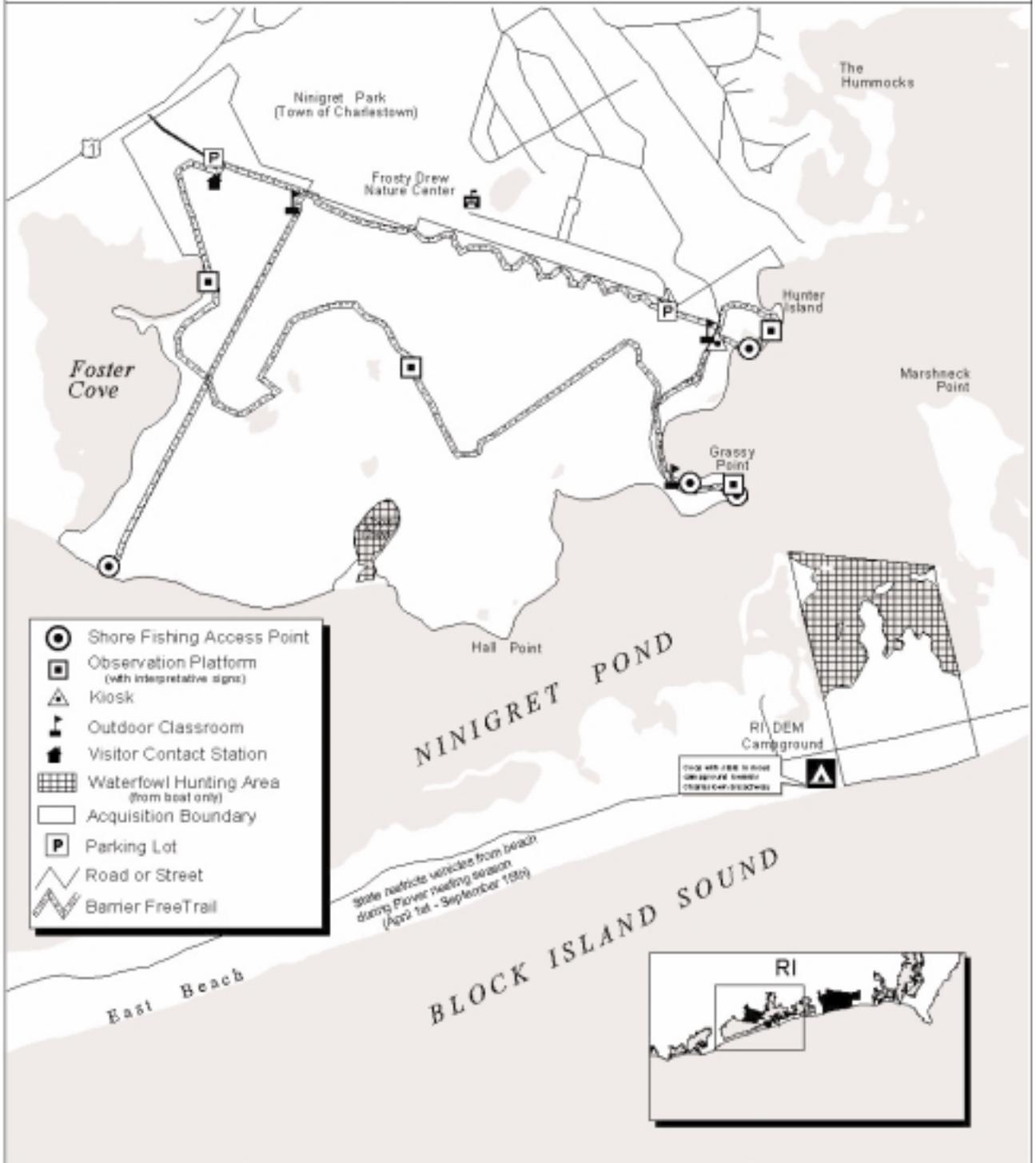
Alternative B: Proposed Action Proposed Habitat Improvements *Ninigret National Wildlife Refuge* *Rhode Island NWR Complex Comprehensive Conservation Plan*



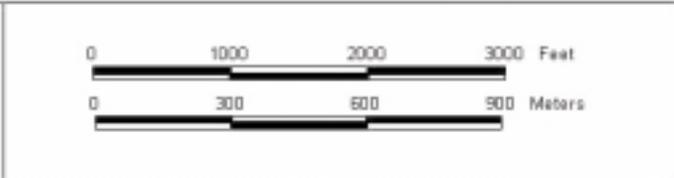
Data Sources:
 1995 1:24,000 Road & Hydrographic
 and 1997 1:250,000 provided by USFWS, RIOWR
 & the New England Wildlife Coastal Program.
 Map prepared for Rhode Island NWR Complex
 Call for Habitat Conservation Plan.
 December 2000
 NWR to be used for regulatory purposes.



Alternative B: Proposed Action
Proposed Public Use
Ninigret National Wildlife Refuge
Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 Bathymetry & Hydrography
 All other data provided by USFWS, NOAA
 & RI. See Appendix B for Coastal Features.
 Map prepared for Rhode Island NWR Complex
 Call on the Coast Guard's PWS.
 December 2000
 Not to be used for legal purposes.

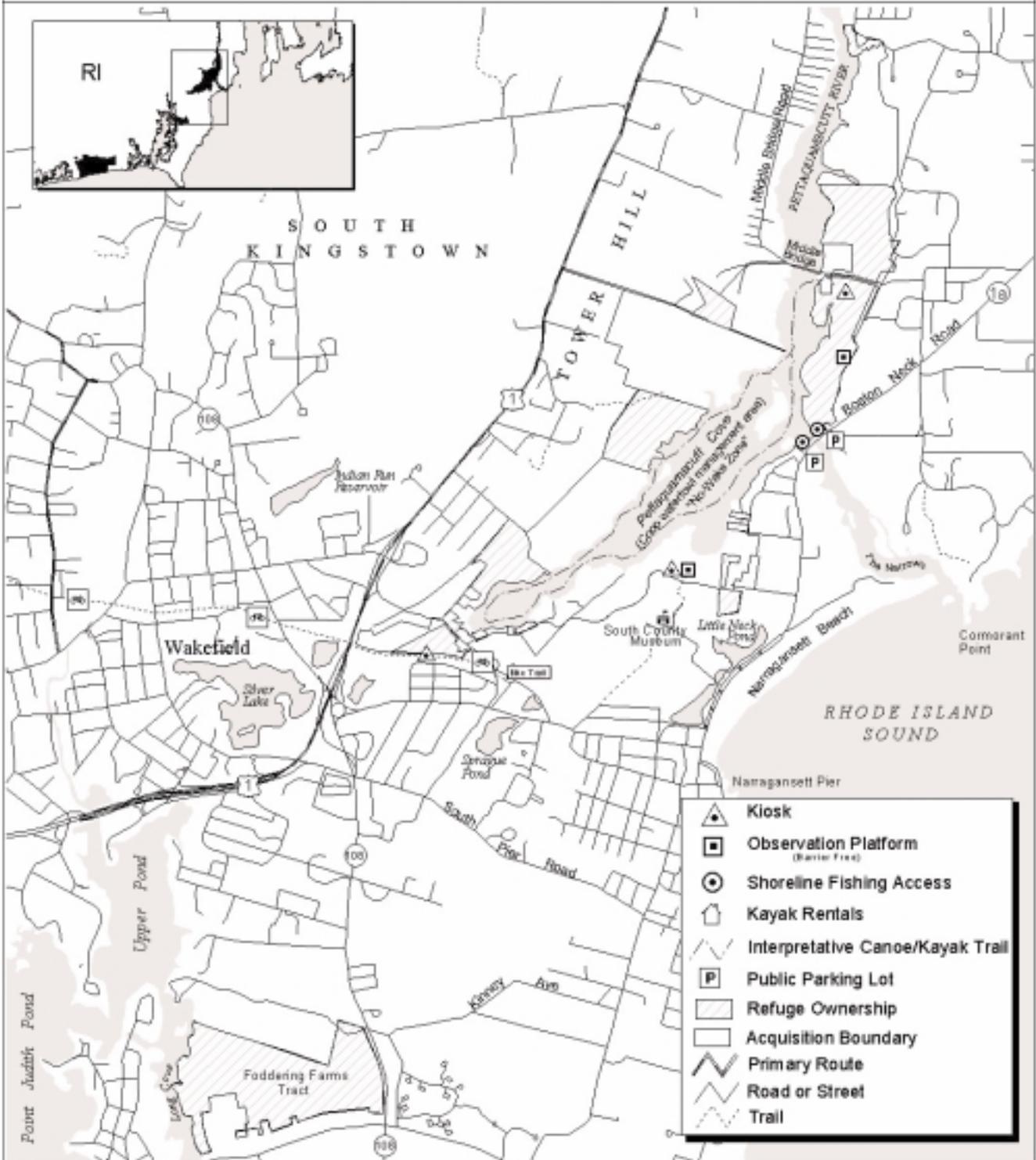


Alternative B: Proposed Action

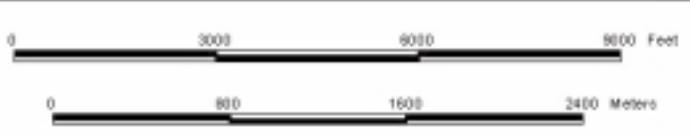
Proposed Public Use/Habitat Improvement

John H. Chafee National Wildlife Refuge

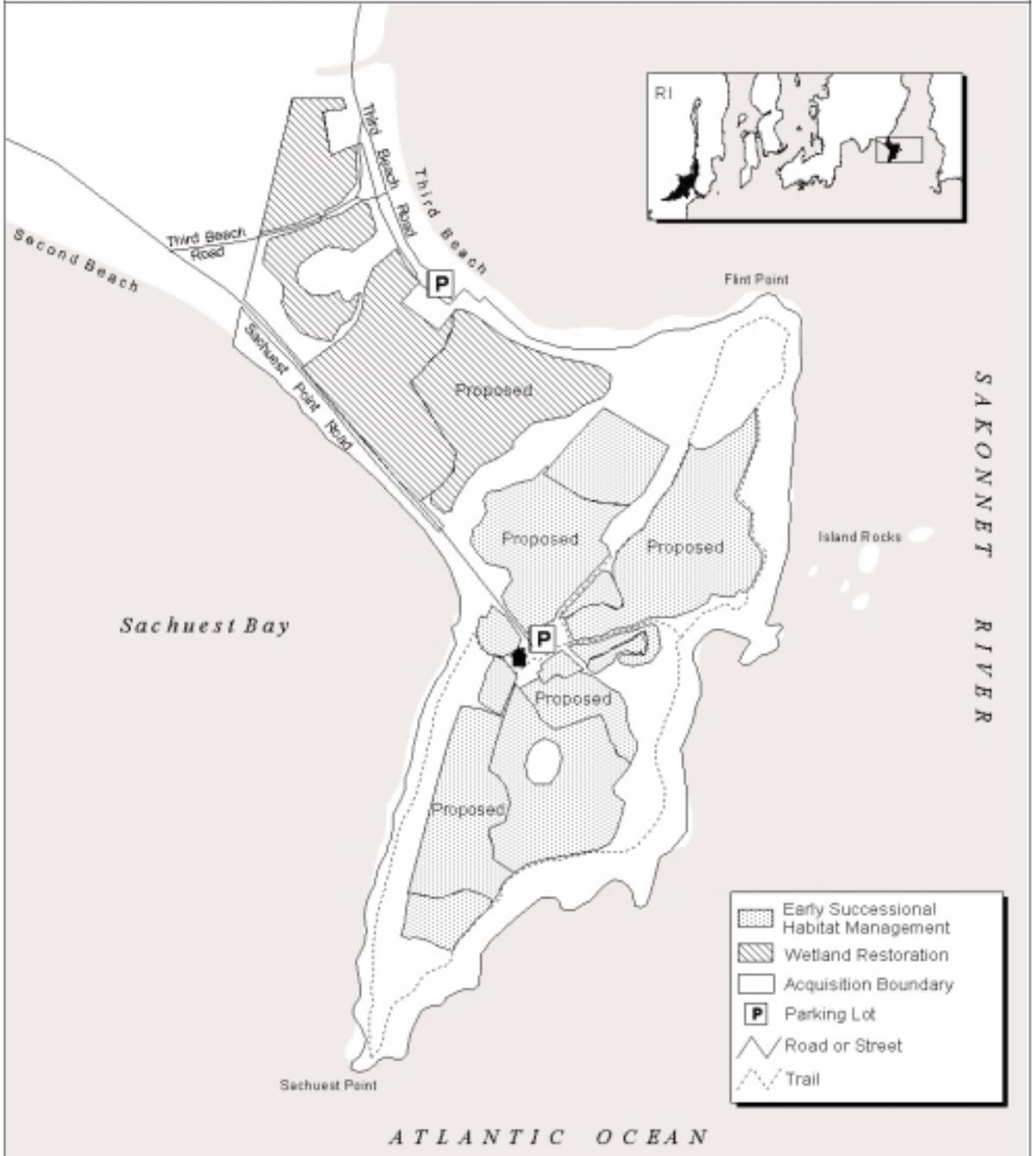
Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 Roads & Hydrography
 All other data provided by USFWS, RI/DIS
 & So. New England R/V Right Coastal Program.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan,
 December 2009
 Not to be used for legal purposes.



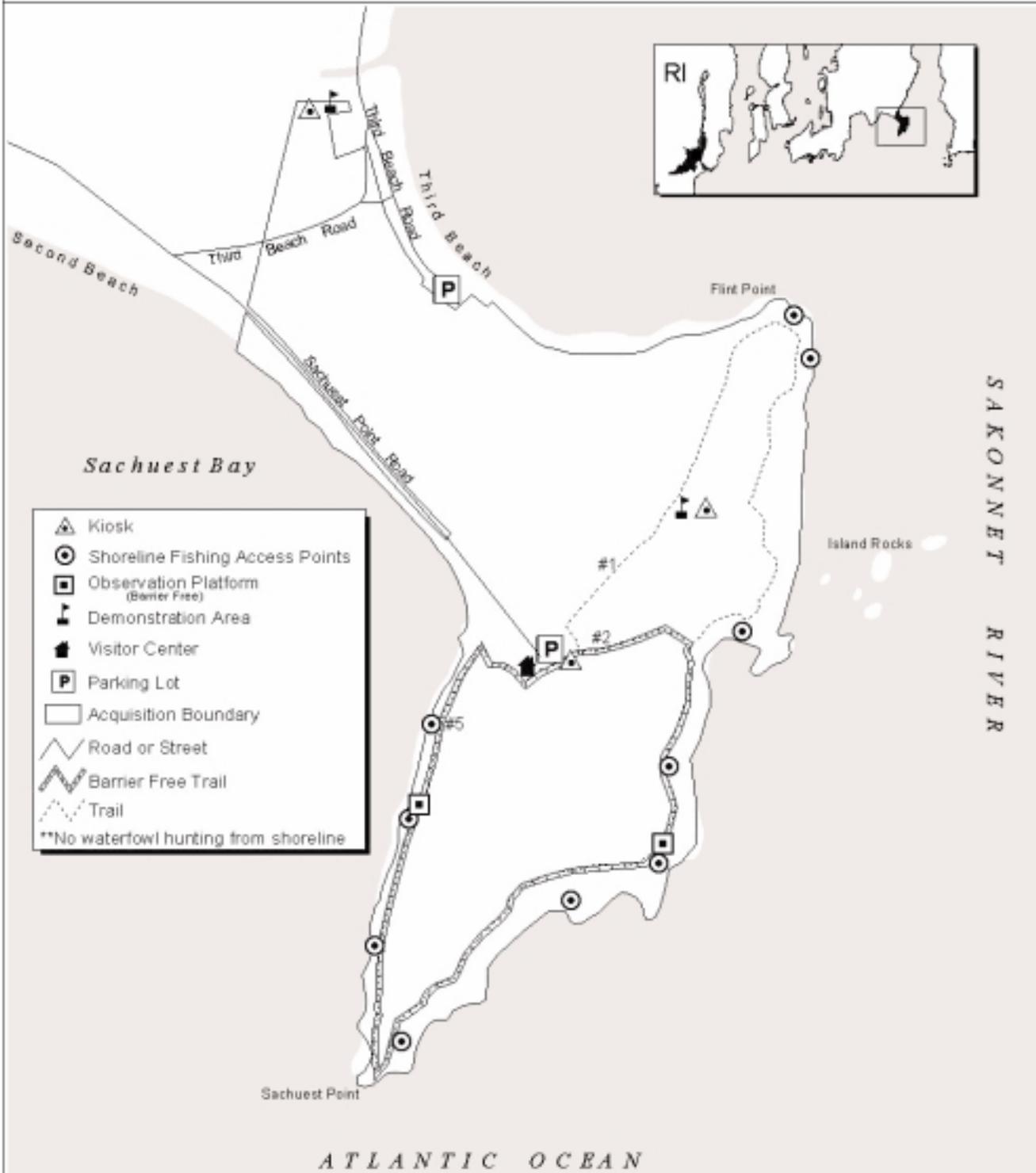
Alternative B: Proposed Action
Proposed Habitat Improvements
Sachuest Point National Wildlife Refuge
Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 2000 1:24,000 Road & Hydrology
 Aerial data provided by USFWS, RIOW
 & Co. See Esri/USFWS Right to Know Program.
 Map prepared by Rhode Island NWR Complex
 Compliance Conservation Plan
 Section 1000
 Not to be used for legal purposes.



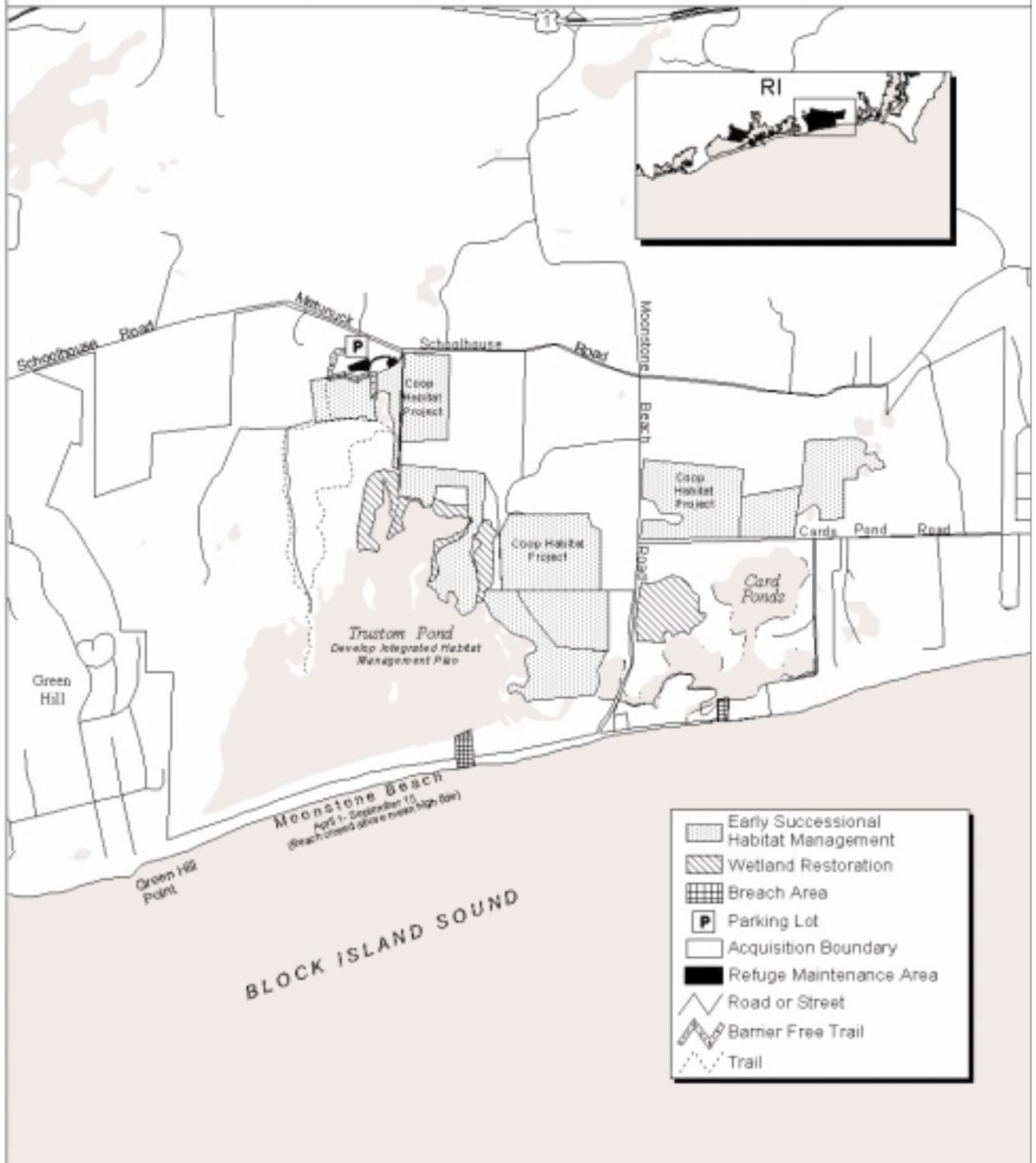
Alternative B: Proposed Action
Proposed Public Use
Sachuest Point National Wildlife Refuge
Rhode Island NWR Complex Comprehensive Conservation Plan



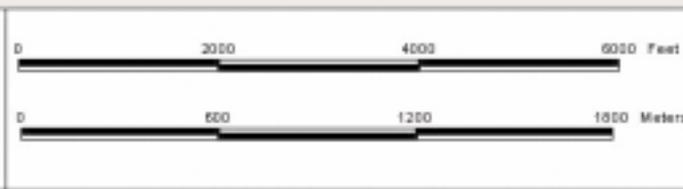
Data Sources:
 2008 1:24,000 Road & Hydrography
 Also see data provided by USFWS, RIDIS
 & So. New England NY State Coastal Program.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan
 December 2008
 NCEC by David M. Eggen-Hopwood.



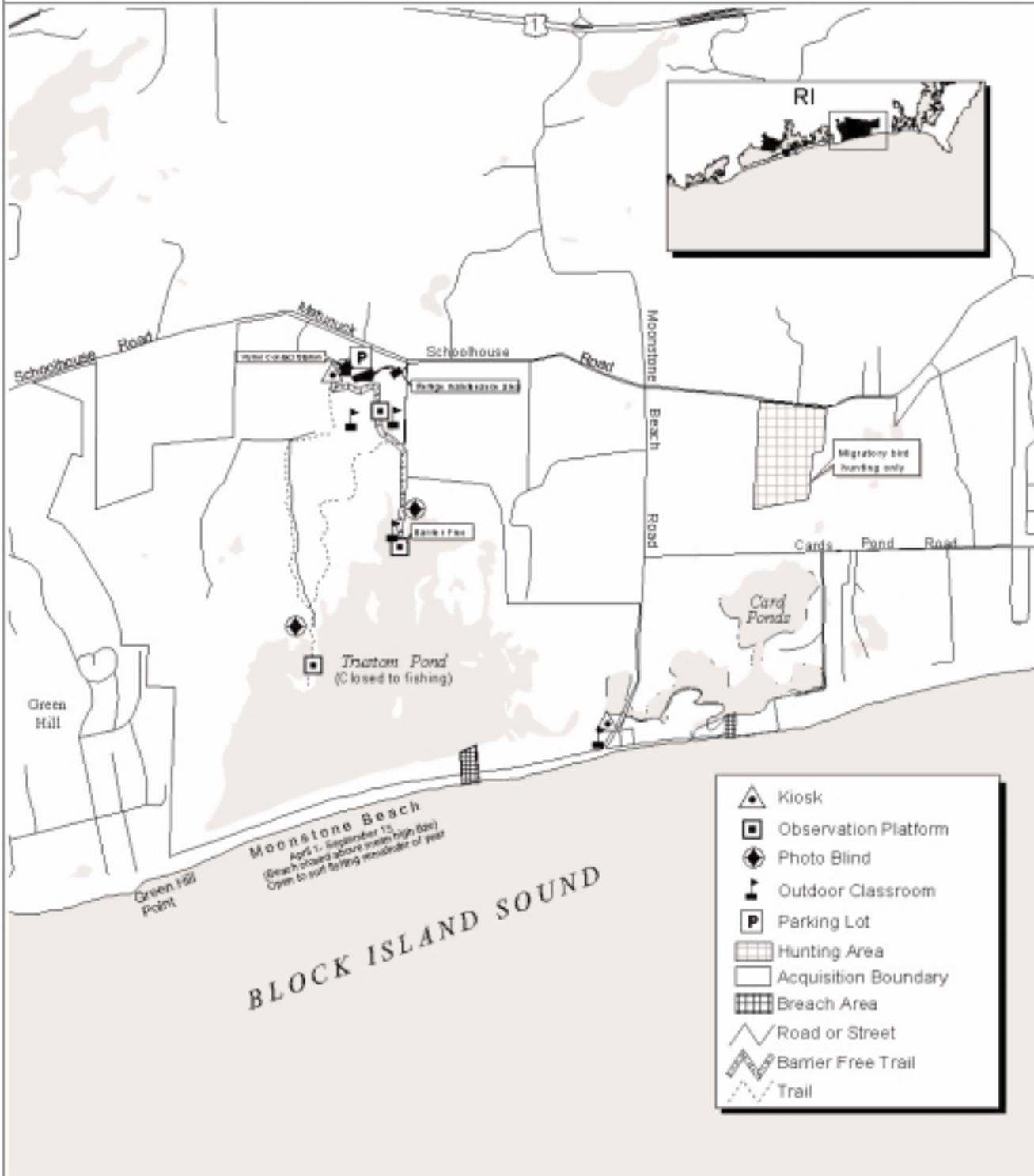
Alternative B: Proposed Action Proposed Habitat Improvements *Trustom Pond National Wildlife Refuge* Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
USGS 1:25,000 8402 & Hydrography
Aerial data provided by USFWS, RIWS
& the New England Wetlands Program.
Map prepared for Block Island NWR Complex
Comprehensive Conservation Plan,
December 2000.
Not to be used for legal purposes.
Contact: 508-685-1242 or 202-960-5110 (toll-free)



Alternative B: Proposed Action Proposed Public Use *Trustom Pond National Wildlife Refuge* *Rhode Island NWR Complex Comprehensive Conservation Plan*



Data Sources:
 USGS 1:24,000 Road & Hydrography
 Aerial data provided by USFWS, ITD & So. New England's Inland Coastal Program.
 Map prepared for Block Island NWR Complex
 Comprehensive Conservation Plan
 December 2002
 Not to be used for legal purposes.
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Alternative C

This alternative is similar to Alternative B in its emphasis on protecting piping plover and other species of concern, increasing baseline biological inventories and monitoring, and grassland and wetlands habitat restoration on Refuge lands. Alternative C generally goes a step further, however, in increasing the involvement of Refuge staff in watershed or ecosystem-based land and resource planning and implementation efforts with partners throughout Rhode Island. For example, this alternative proposes that Refuge staff take the lead in implementing the Piping Plover Recovery Plan tasks in Rhode Island, take the lead in implementing Ecosystem Team priority actions related to piping plover, grasslands and invasive plants, and to actively participate in watershed-based partnerships in the Wood-Pawcatuck Rivers, Narrow River, and South Shore watersheds. Cooperative land protection and land acquisition on up to 11,550 acres is significantly greater than proposed in Alternatives A, B or D.

This alternative would improve the quality of existing public use opportunities beyond what is proposed in Alternative A, but generally does not expand opportunities nor promote an increase in visitation as in Alternatives B and D. The only public use expansion proposed would be to improve the quality of existing environmental education programs and sponsor “Teach the Teacher” workshops to promote an increased understanding of and stewardship for species and habitats of special management concern.

Implementation of Alternative C would result in a decrease in current fishing opportunities and would restrict public access to designated areas. The only hunting opportunity on Trustom Pond would be effectively eliminated with restoration of the 20 acre upland site to native, warm season grasses. Overall visitation to the Refuge Complex would be expected to increase slightly (approximately 15%) as a result of improvements to existing public use programs and as a result of the new Visitor Center. All nonwildlife dependent and incompatible activities would be phased out by 2002, more quickly than Alternatives A, B, or D. These activities include recreational ORV use, dog walking, swimming and sunbathing, jogging, kite flying, bicycling, roller blading, horseback riding, and bonfires.

Involvement by volunteers, partners, and The Friends of the National Wildlife Refuges of Rhode Island would be strengthened, similar to Alternatives B and D. Considerably more partnerships would be established, emphasizing ecosystem or watershed-level planning. The visibility of the Service and the Refuges would increase over Alternative A, but less resources would be committed to this as compared to Alternatives B and D. Implementation of Alternative C would also more than double current staffing and notably increase budget levels over what is currently appropriated.

Issue 1: Protection of endangered and threatened species and other species and habitats of special concern

How will piping plover nesting sites be protected at Trustom Pond Refuge?

Under Alternative C, our objective is to increase protection for piping plover chicks by minimizing human-associated disturbances during the most critical stage of the nesting period. Specifically, by 2002, we would cooperate with RI CRMC and RI DEM to implement the following:

- Annually, from April 1 until chicks hatch (approx. late May), place symbolic fencing 10 feet above mean high tide line. This would provide for additional wildlife-dependent public beach use during a less vulnerable nesting period. Individual nest enclosures would be placed according to current practices.
- After hatching, work with RI DEM and RI CRMC to close the entire beach to public use, including the intertidal area to the water, until fledging has occurred (this can occur as late as mid-August). This would reduce the vulnerability of chicks to trampling, disturbance by dogs, and unnecessary, excessive energy expenditures while fleeing. It is important to note that the Service has no jurisdiction below the mean high tide line, and as such, implementation of this alternative would require cooperation with RI DEM and RI CRMC.
- From fledging to Sept. 15, we would place symbolic fencing at the original location; 10 feet above mean high tide. This enclosed area would continue to provide protection to fledged chicks and migrating shorebirds.
- To support the program, we would hire personnel similar to those identified in Alternative B.

How will piping plover nesting sites be protected at Ninigret Refuge barrier beach and active sites in the South Shore of Rhode Island?

Same as Alternative B.

How will piping plover nesting sites be protected in the Block Island Focus Area?

Under Alternative C, in addition to that stated for Alternative B, our objective would be to eliminate the risk of vehicles impacting piping plover or habitat suitability by implementing the following action:

- By 2003, we would close Refuge beaches above the mean high tide line to vehicles year round to eliminate impacts from vehicles to nesting and migrating shorebirds and to minimize physical destruction to the barrier beach, dunes, and vegetation.

How will piping plover predators be managed on Rhode Island Refuge Complex nesting sites?

Same as Alternative B.

How can piping plover habitat be improved at Trustom Pond Refuge?

Same as Alternative B.

How will the Service coordinate with other agencies and private landowners to protect piping plover throughout the South Shore Focus Areas?

Under Alternative C, our objective is to maximize interagency coordination and cooperation in managing piping plover in Rhode Island. We would implement the following action, in addition to Alternative B:

- **By 2005, initiate a Piping Plover Working Group to implement Recovery Plan tasks in Rhode Island.**

How will the Refuge Complex increase public awareness of piping plover issues through outreach and education?

Same as Alternative B.

How will the Refuge Complex ensure that piping plover management practices are based on sound science?

Same as Alternative B.

How will the Refuge Complex contribute to the protection and restoration of the American burying beetle population within the Block Island Focus Area?

Same as Alternative B.

How will the Refuge Complex protect bald eagle habitat within the Block Island Focus Area?

Same as Alternative B.

How will the Refuge Complex contribute to establishing populations of northeastern beach tiger beetle in the South Shore of Rhode Island?

Same as Alternative B.

How will the Refuge manage habitat for black duck at Chafee and Trustom Pond Refuges?

Under Alternative C, our objective is to work cooperatively to increase the quality of Pettaquamscutt Cove and Trustom Pond Refuge as a waterfowl rest areas and maximize opportunities for wildlife viewing.

- **By 2003, we would work with the Town of South Kingstown, RI DEM and Audubon Society of Rhode Island to designate a no-hunting “rest area” for all waterfowl in Pettaquamscutt Cove and lower Narrow River. Currently, the Narragansett-side of the cove is closed to hunting while the South Kingstown-side is open.**

- Closure of the entire cove to hunting would establish a rest area during migration and wintering when concentrations of black duck and other waterfowl are greatest. This effort would also facilitate development of a Watchable Wildlife Area. It is important to recognize that the Service has no jurisdiction over lands and waters below mean high tide, or open navigable waters, thus, implementation of this action would require cooperation with RI DEM.
- No hunting would occur on Trustom Pond Refuge.
- By 2003, in addition to mute swan control during the nesting season as proposed in Alternative B, we would remove all adult swans, to the extent practicable, throughout the year.

How will the Refuge protect wintering harlequin duck at Sachuest Point Refuge?

Same as Alternative B.

How will waterfowl concentration areas be managed on the Refuge Complex?

Same as Alternative B.

How will important marsh and wading bird habitat areas be protected on the Refuge Complex ?

Under Alternative C, our objective is to increase interagency and partner coordination to promote the protection of wading bird nesting sites. In addition to actions in Alternative B, we would implement the following:

- By 2002, work cooperatively with RI DEM, RI Heritage Program, and The Nature Conservancy to identify active, inactive or historical marsh and wading bird nesting sites in South Shore Focus Areas and determine potential for re-colonization.
- Identify opportunities to acquire important marsh and wading bird habitats within Focus Areas.

How will least tern nesting sites be protected on the Rhode Island Refuge Complex?

Same as Alternative B.

How will the Service protect and improve feeding and staging shorebird concentration areas along the South Shore of Rhode Island and on Block Island?

Under Alternative C, our objective is to eliminate the risk of vehicles impacting shorebirds on Block Island Refuge. In addition to Alternative B, we would:

- By 2003, close Block Island beaches above mean high tide to vehicles year round to protect nesting, migrating, and wintering shorebirds.

How will the Refuge Complex protect and manage other landbirds of management concern on the Rhode Island Refuge Complex?

Same as Alternative B.

How will the Refuge Complex protect seal haul-out areas on Refuge lands?

Same as Alternative B.

How will the Refuge Complex improve anadromous fish habitat in Pettaquamscutt Cove (Narrow River), Trustom Pond, and the Wood-Pawcatuck Rivers?

Under Alternative C, our objective is to increase interagency and conservation partnerships in all watersheds affecting the Refuges to promote watershed protection. In addition to Alternative B, we would implement the following:

- By 2002, the Refuge would become an active participant in the Pawcatuck Watershed Partnership, the RI CRMC proposed Narrow River Interagency Working Group, and the South County Watershed Partnership to promote anadromous fisheries management and improved water quality. Each of these groups is involved in watershed protection with proposed Focus Areas.

How will the Refuge Complex protect amphibian and reptile populations and habitats on Refuge lands?

Same as Alternative B.

How will Refuge staff protect and manage rare plant habitats on the Rhode Island Refuge Complex?

Same as Alternative B.

Issue 2: Restoration and maintenance of coastal sandplain natural communities, including grasslands

Where will Refuge staff restore grassland communities on the Rhode Island Refuge Complex?

Under Alternative C, our objective is to eliminate continued maintenance of non-native grasslands on Trustom Pond and expand our influence on promoting grasslands restoration throughout the South Shore. We would implement the following actions in addition to Alternative B:

- By 2004, convert the 20 upland acres at Trustom Pond Refuge, currently in non-native cool season grasses, to early successional native coastal sandplain habitat.
- By 2005, work with partners to prioritize sandplain grassland restoration opportunities within the South Shore and Sachuest Point Focus Areas.
- We would also determine the Refuge's role in projects off-Refuge and develop partnership agreements to share resources.

How will grassland restoration be implemented on the Rhode Island Refuge Complex?

Same as Alternative A.

How will the Refuge Complex promote grassland restoration on private lands?

Same as Alternative B.

Issue 3: Management of the beach strand ecological community

How will Refuge staff contribute to the protection and restoration of beach strand communities?

Under Alternative C, our objective is to champion beach strand protection measures recommended by the Ecosystem team and eliminate vehicle impacts to the beach strand habitat on Block Island Refuge. We would implement the following actions in addition to Alternative B:

- By 2002, we would begin work on action items identified in the 1996 CT River/Long Island Sound Ecosystem team's Strategic Plan related to beach strand communities in Rhode Island. Action items include prioritizing beach strand sites, identifying and mapping current and historical populations of target species, determining threats at each site, and implementing site protection plans.
- By 2003, we would close Block Island Refuge beaches above the mean high tide line to vehicles year round to protect nesting and migrating shorebirds and to minimize physical impacts to the barrier beach and dune structure and vegetation.

Issue 4: Management of Trustom Salt Pond

How should Trustom and Cards Ponds be managed to improve water quality and benefit species of concern?

Under Alternative C, our objective is to increase public awareness, and interagency and conservation partnerships in the Trustom Pond watershed to promote watershed protection.

- By 2005, we would initiate a watershed based, landscape-level approach to improving water quality and habitat conditions for Trustom and Cards Ponds. We would work towards identifying the significant sources of pollution directly impacting the ponds and follow with outreach and education within the community.
- We would also participate in a South Shore Area Working Group (yet to be organized) recommended in the 1998 RI CRMC Special Area Management Plan, and in the established South County Watershed Partnership.

Issue 5: Protection and restoration of wetlands

How will Refuge staff restore and promote wetland ecosystems on the Rhode Island Refuge Complex?

Under Alternative C, our objective is to increase interagency and conservation partner involvement in the identification and implementation of wetland restoration projects throughout the South Shore.

- By 2010, we would develop with partners a list of top priority wetlands restoration projects and implementation plans throughout the South Shore and Sakonnet River-Westport River Focus Areas. We would also determine the roles of Refuge staff in the top priority restoration projects and develop partnership agreements to facilitate sharing of resources.

Issue 6: Improving water quality in the Narrow River

How will Refuge staff contribute to improving and protecting the water quality of Pettaquamscutt Cove and the Narrow River Watershed?

Same as Alternative B.

Issue 7: Control of invasive, non-native, or overabundant plant and wildlife species

How will Refuge staff control non-native and/or invasive plant species on the Refuge Complex?

Same as Alternative B.

How will Refuge staff manage non-native, invasive mute swan on the Rhode Island Refuge Complex to reduce adverse effects on waterfowl and water quality?

Under Alternative C, our objective is to eliminate the presence of mute swan on the Refuge Complex. Strategies to accomplish this goal would be the same as those identified in Alternative B.

How will Refuge staff manage deer populations within and adjacent to the Refuge Complex?

Same as Alternative B.

Issue 8: New Refuge Complex land acquisition and cooperative protection of sensitive habitat sites

How will the Service's land acquisition program be expanded to protect species and habitats of special concern?

Under Alternative C our objective is to increase interagency and conservation partnerships in cooperatively protecting and managing important conservation areas throughout the South Shore and Block Island Focus Areas.

- By 2001, with partners, we would begin active cooperative land protection and acquisition from willing sellers. Acquisition of 11,550 acres within Level 1 and Level 2 Focus Areas would be approved. Parcels would be acquired using the same priority criteria proposed for Alternative B. A new Refuge may be established if significant land acquisition occurs within the Wood-Pawcatuck and/or Sakonnet River/Westport River Focus Areas.
- By 2004, we would work with Block Island partners to develop a comprehensive land and resource protection plan for the entire Block Island Focus Area.
- By 2008, with partners, we would develop land and resource protection plans for all other Focus Areas.

Additional details are provided in the “Land Protection Alternative Development” section earlier in this chapter.

Issue 9: Access to credible natural resource information on the Refuge Complex to ensure management decisions are based on the best available science

How will Refuge staff establish needs for and begin to collect baseline biological information across the Rhode Island Refuge Complex?

Same as Alternative B.

How will Refuge staff insure that biological integrity of natural communities will be maintained on the Rhode Island Refuge Complex?

Same as Alternative B.

Issue 10: Management of public use and access (except hunting and environmental education which are discussed separately)

How will Refuge staff improve Visitor Services?

Same as Alternative A.

How will Refuge staff improve existing partnerships with groups involved in or influencing public use activities on the Refuges?

Same as Alternative B.

What fishing opportunities will be available at Block Island Refuge?

Under Alternative C, our objective is to minimize the impacts of fishing to wildlife during sensitive nesting periods and eliminate the impacts of vehicles on wildlife and beach strand habitats.

- By 2002, we would close all Refuge beaches above the mean high tide line, including Beane Point, to surf fishing during shorebird, heron, and other waterbird nesting seasons, and shorebird migration (approx. April 1 to September 15 each year), but allow fishing the remainder of the year, in accordance with state regulations.
- By 2003, vehicles would be restricted from beaches year round to minimize physical impacts to the barrier beach, dune structure and vegetation.

- Beane Point would be closed to all public uses, including surf fishing above the mean high tide line, except for seasonal environmental education programs.

What fishing opportunities will be available at Ninigret Refuge?

Same as Alternative B.

What fishing opportunities will be available at Chafee Refuge?

Under Alternative C, our objective is to eliminate shoreline erosion caused by fishing.

- By 2002, we would close the Refuge shoreline to reduce erosion impacts. Fishing would be allowed from boats only, in accordance with state regulations.

What fishing opportunities will be available at Sachuest Point Refuge?

Under Alternative C, our objective is to protect Refuge resources and infrastructure by eliminating impacts caused by night fishing.

- By 2002, we would close the Refuge to night fishing to eliminate the enforcement issues associated with night time use of the Refuge including littering, bonfires, and vandalism of signs and structures.

What fishing opportunities will be available at Trustom Pond Refuge?

Same as Alternative A.

What kind of interpretive opportunities will be available at Block Island Refuge?

Under Alternative C, our objective is to focus interpretive opportunities off-Refuge at sites where the majority of Block Island visitors would be reached.

- By 2003, we would work with The Nature Conservancy to develop interpretive programs at off-refuge sites including the North Light, Settlers Rock, and on the ferry. These are locations likely to reach the greatest number of visitors with the least impact on Refuge resources.

What kind of interpretive opportunities will be available at Ninigret Refuge?

Under Alternative C, our objective is to focus limited resources on the following interpretive opportunities:

- By 2002, we would complete construction of the 3.8 mile, barrier-free "Trail through Time".

What kind of interpretive opportunities will be available at Chafee Refuge?

Under Alternative C, our objective is to focus limited resources on the following interpretive opportunities:

- By 2003, we would ensure that RI DOT constructs an interpretive kiosk on the Refuge, along the proposed South County Bike Trail.

What kind of interpretive opportunities will be available at Sachuest Point Refuge?

Under Alternative C, our objective is to focus limited resources on the following interpretive opportunities:

- By 2004, we would complete renovation of the Visitor Center and exhibitry. We would construct kiosks to interpret wetland and grassland restoration efforts, and the invasive plant control program on the Refuge.

What kind of interpretive opportunities will be available at Trustom Pond Refuge?

Under Alternative C, our objective is to focus limited resources on the following interpretive opportunities:

- By 2005, construct interpretive signs along the trail at the grassland restoration site, barrier beach and salt pond.

What kind of wildlife observation and photography opportunities will be available at Block Island Refuge?

Under Alternative C, our objective is to maintain wildlife and photography opportunities while minimizing the risk of impact to other resources.

- By 2005, we would designate trails for pedestrian use only. Vehicles would be restricted year round from Refuge beaches. The public use closure on Beane Point would be maintained, except for seasonal environmental education programs.

What kind of wildlife observation and photography opportunities will be available at Ninigret Refuge?

Under Alternative C, our objective is to focus limited resources on the following wildlife and photography opportunity:

- By 2002, secure funding to complete construction of the 3.8 mile, barrier-free "Trail Through Time". Public access would be restricted to designated trails and shoreline access points.

What kind of wildlife observation and photography opportunities will be available at Chafee Refuge?

Under Alternative C, our objective is to focus limited resources on the following wildlife and photography opportunity:

- By 2005, restore the Bridgeport Commons subdivision to native grassland and replace existing asphalt with a universally accessible trail system.

What kind of wildlife observation and photography opportunities will be available at Sachuest Point Refuge?

Under Alternative C, our objective is to maintain wildlife and photography opportunities while minimizing the risk of impact to other resources.

- By 2004, we would close and restore unnecessary and degraded trails. We would also restrict shoreline access to designated points and evaluate charging entrance fees to the Refuge to support maintenance of observation facilities.

What kind of wildlife observation and photography opportunities will be available at Trustom Pond Refuge?

Under Alternative C, our objective is to maintain wildlife and photography opportunities while minimizing the risk of impact to other resources.

- By 2003, we would reduce unnecessary trails and restrict public use to trails only.

How will nonwildlife dependent activities be managed at Block Island, Chafee, Sachuest Point, and Trustom Pond Refuges?

Under Alternative C, our objective is the same as Alternative B, except that we would implement restrictions sooner. Specifically, we would:

- By 2002, eliminate all inappropriate, incompatible, and/or nonwildlife dependent activities.

How will nonwildlife dependent activities be managed at Ninigret Refuge?

Under Alternative C, our objective would be the same as Alternative B, except that we would implement restrictions sooner. Specifically, we would:

- By 2001, implement outreach program and begin enforcement of “no dog-walking and bicycling” (which have been allowed while runways were in place).
- By 2001, hire an additional seasonal law enforcement officer to provide more consistent, thorough outreach and enforcement to deal with incompatible activities.
- By 2002, we would eliminate all inappropriate, incompatible, and/or nonwildlife dependent activities, such as those described for Alternative A.

What priority public uses would be allowed on newly acquired Refuge lands?

Same as Alternative B.

How will the Refuge promote and cultivate the relationship with the Friends of the National Wildlife Refuges of Rhode Island?

Same as Alternative B.

Issue 11: Hunting on the Refuges

What hunting opportunities will be available at Block Island, Chafee, and Ninigret Refuges?

Same as Alternative B.

What hunting opportunities will be available at Sachuest Point Refuge?

Same as Alternative A.

What hunting opportunities will be available at Trustom Pond Refuge?

Under Alternative C, our objective is to restore the hunting field to native grasslands, while continuing to allow hunting to the extent practicable.

- By 2001, we would convert the 20 acre upland field to native grasslands, which would effectively eliminate the field as good waterfowl foraging habitat and reducing the quality of this hunting area. Similar to Alternative B, no additional hunting is proposed at this time on Trustom Pond Refuge.

Issue 12: Increased opportunities for environmental education

What curriculum-based environmental education opportunities will be available at Block Island?

Same as Alternative B.

What curriculum-based environmental education opportunities will be available at Ninigret Refuge?

Under Alternative C, our objective is to focus limited resources on the following environmental education opportunities. In addition to actions identified for Alternative A, we would:

- By 2002, sponsor “Teach the Teacher” workshops featuring grassland restoration and pond ecology linked to the outdoor classroom sites.

What curriculum-based environmental education opportunities will be available at Chafee Refuge?

Under Alternative C, our objective is to focus limited resources on the following environmental education opportunities. In addition to actions identified for Alternative A, we would:

- By 2004, sponsor “Teach the Teacher” workshops that feature the natural resources in the Narrow River and Pettaquamscutt Cove.

What curriculum-based environmental education opportunities will be available at Sachuest Point Refuge?

Under Alternative C, our objective is to focus limited resources on the following environmental education opportunities. In addition to actions identified for Alternative A, we would:

- By 2003, we would sponsor “Teach the Teacher” workshops featuring grasslands and wetlands restoration work and invasive plant control. By 2005, we would develop a formal partnership with the Norman Bird Sanctuary to facilitate sharing of resources.

What curriculum-based environmental education opportunities will be available at Trustom Pond Refuge?

Under Alternative C, our objective is to focus limited resources on the following environmental education opportunities. In addition to actions identified for Alternative A, we would:

- By 2002, sponsor “Teach the Teacher” workshops featuring pond and barrier beach ecology, and grassland restoration work linked to the existing outdoor classroom.

Issue 13: Ability to provide staffing, operations, and maintenance support needed to accomplish goals and objectives

How does the proposed alternative change the funding requirements of the Rhode Island Refuge Complex?

Successful implementation of Alternative C relies on our ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Under Alternative C, our objective is to obtain the funding outlined below:

- By 2003, funding would increase substantially, commensurate with the staffing and project lists outlined for Alternative C in Appendices F and H.
- Full implementation of this alternative would require an annual increase of \$569,000 for salary, and a total increase of \$8.9 million in RONS projects (not including recurring costs). An additional \$3.8 million is identified in the MMS database.

What will be the staffing needs of the Rhode Island Refuge Complex?

As stated above for funding, successful implementation of Alternative C relies on our ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Under Alternative C, our objective is to increase staffing as outlined below:

- 27 full time personnel, and
- 15 seasonal personnel
- By 2003, we would assign some staff to Sachuest Point and Block Island Refuges as depicted on the staffing charts (Appendix H). The rest would be stationed at the current office, pending completion of the new Refuge Complex Headquarters/Visitor Center.

How will the Service ensure protection of cultural resources on the Rhode Island Refuge Complex?

Under Alternative C, our objective is to vastly increase our knowledge of and protection for cultural resources on the Refuge Complex.

- By 2005, we would substantially increase our commitment of resources toward increasing and improving available information on cultural resources. We would initiate a field investigation on all Refuges and record all information in a GIS database. We would also develop curriculum for local schools tied specifically to cultural resources.

- By 2005, we would train all staff with collateral law enforcement duties in ARPA regulations.
- Similar to Alternative B, by 2005, we would develop a partnership agreement with the Narragansett Indian Tribal Council to facilitate cooperation on environmental education and interpretation, to improve our understanding of the context of these resources, and to increase site identification and protection.
- By 2010, we would develop a Cultural Resources Protection Plan for recorded sites.

Issue 14: Increased visibility of the U.S. Fish & Wildlife Service

How will the Refuge increase Service visibility and recognition of the National Wildlife Refuge System?

Same as Alternative B.

Issue 15: Need for improved facilities

What facilities are needed to improve administrative and visitor contact services on the Rhode Island Refuge Complex?

Same as Alternative B.

When will the Rhode Island Refuge Complex improve road and entry signs to meet national standards and better serve visitors?

Under Alternative C, our objective is to focus limited resources on improving signs at two locations.

- By 2003, we would focus efforts on ensuring directional signs at the Complex Headquarters and for Ninigret Refuge (on US Route 1) meet national standards.



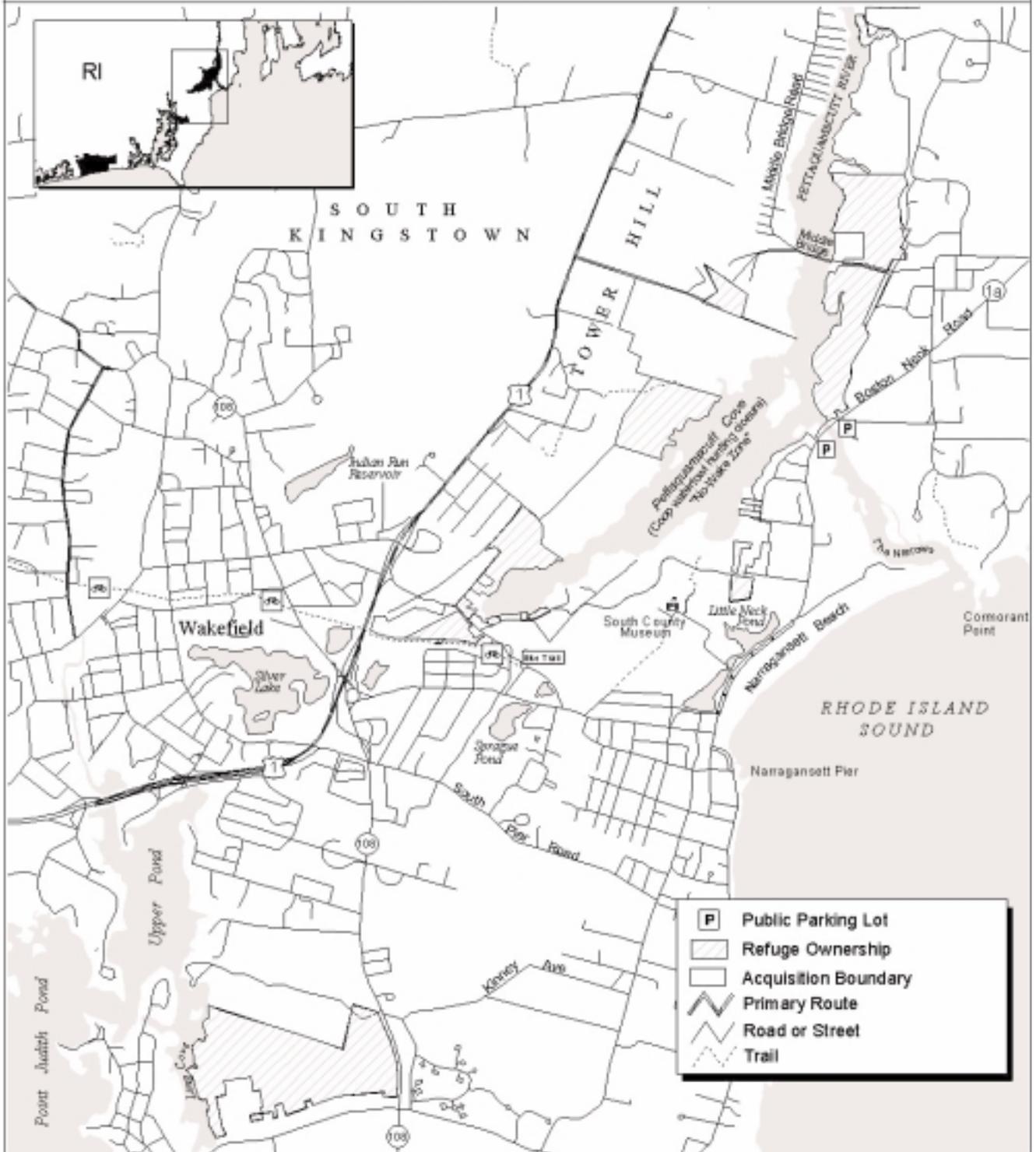
Trustom Pond Refuge. USFWS photo

Alternative C

Proposed Public Use/Habitat Improvement

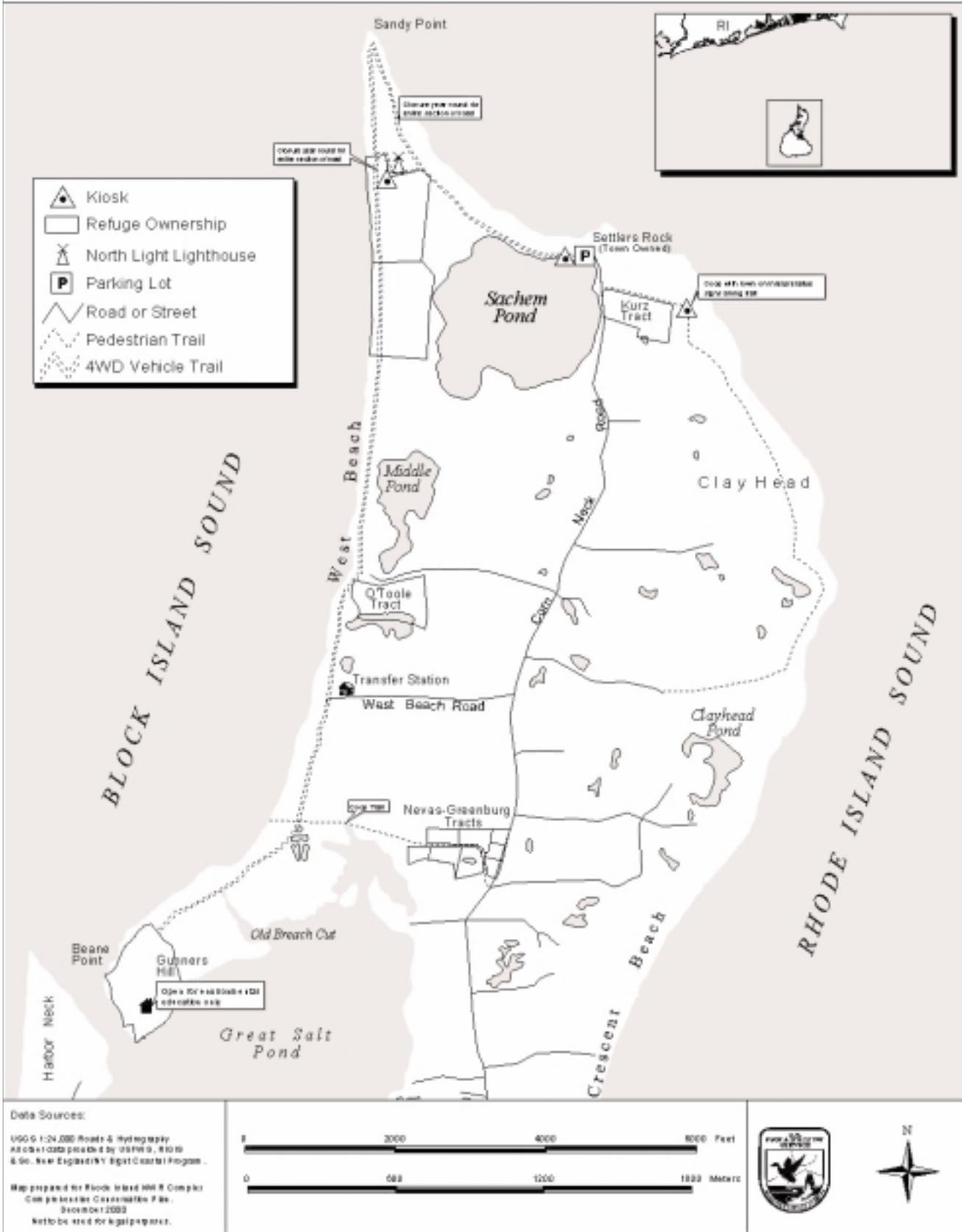
John H. Chafee National Wildlife Refuge

Rhode Island NWR Complex Comprehensive Conservation Plan



<p>Data Sources:</p> <p>USGS 1:24,000 Roads & Hydrography All other data provided by USFWS, RI GIS & Co. New England/WF Bight Coastal Program.</p> <p>Map prepared for Rhode Island NWR Complex Comprehensive Conservation Plan. December 2000 Not to be used for legal purposes.</p>	<p>0 3000 6000 9000 Feet</p> <p>0 800 1600 2400 Meters</p>	
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Alternative C Proposed Public Use/Habitat Improvement Block Island National Wildlife Refuge *Rhode Island NWR Complex Comprehensive Conservation Plan*

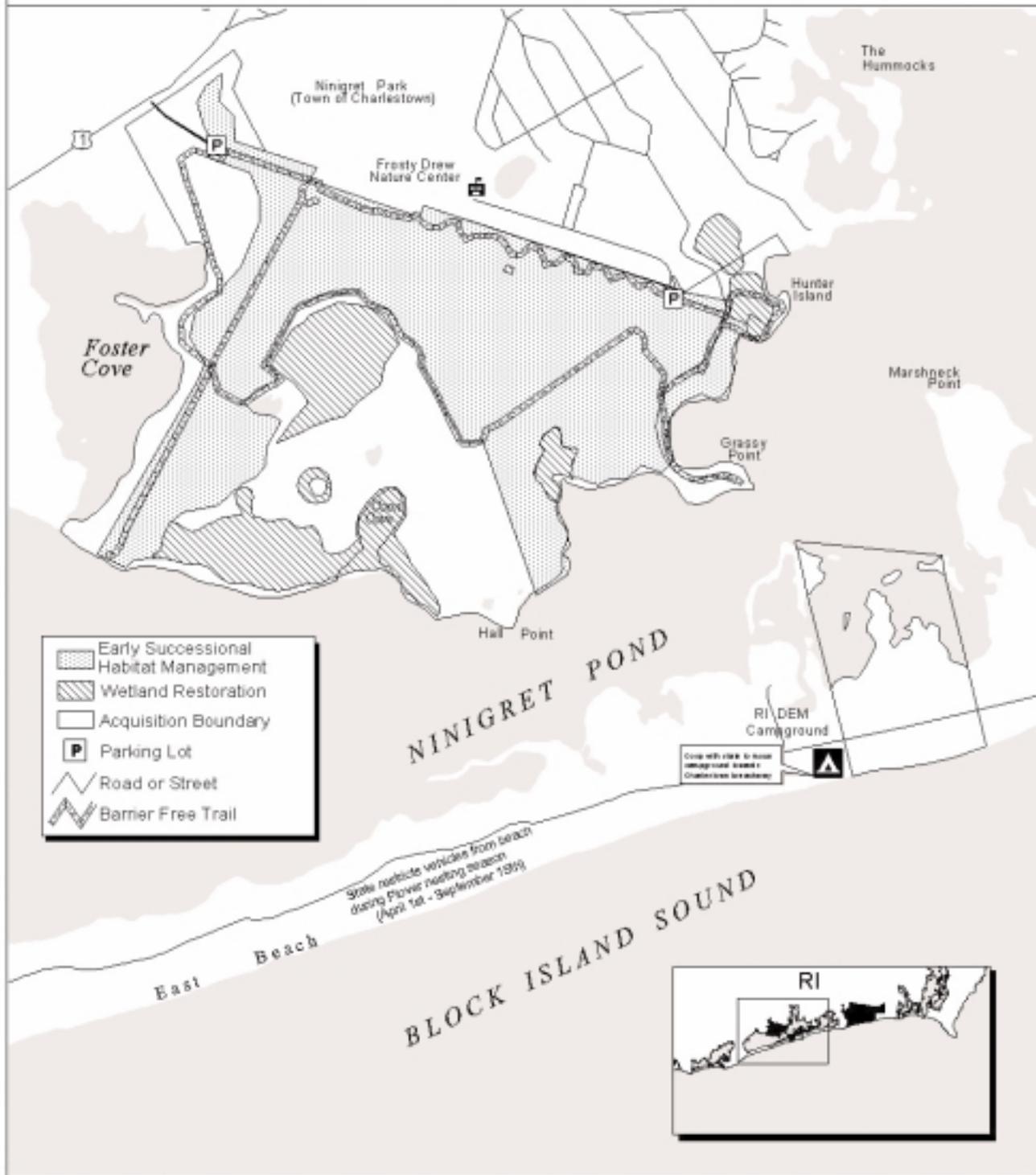


Alternative C

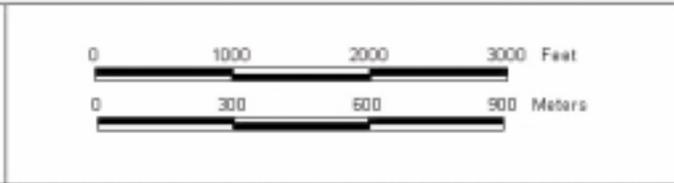
Proposed Habitat Improvements

Ninigret National Wildlife Refuge

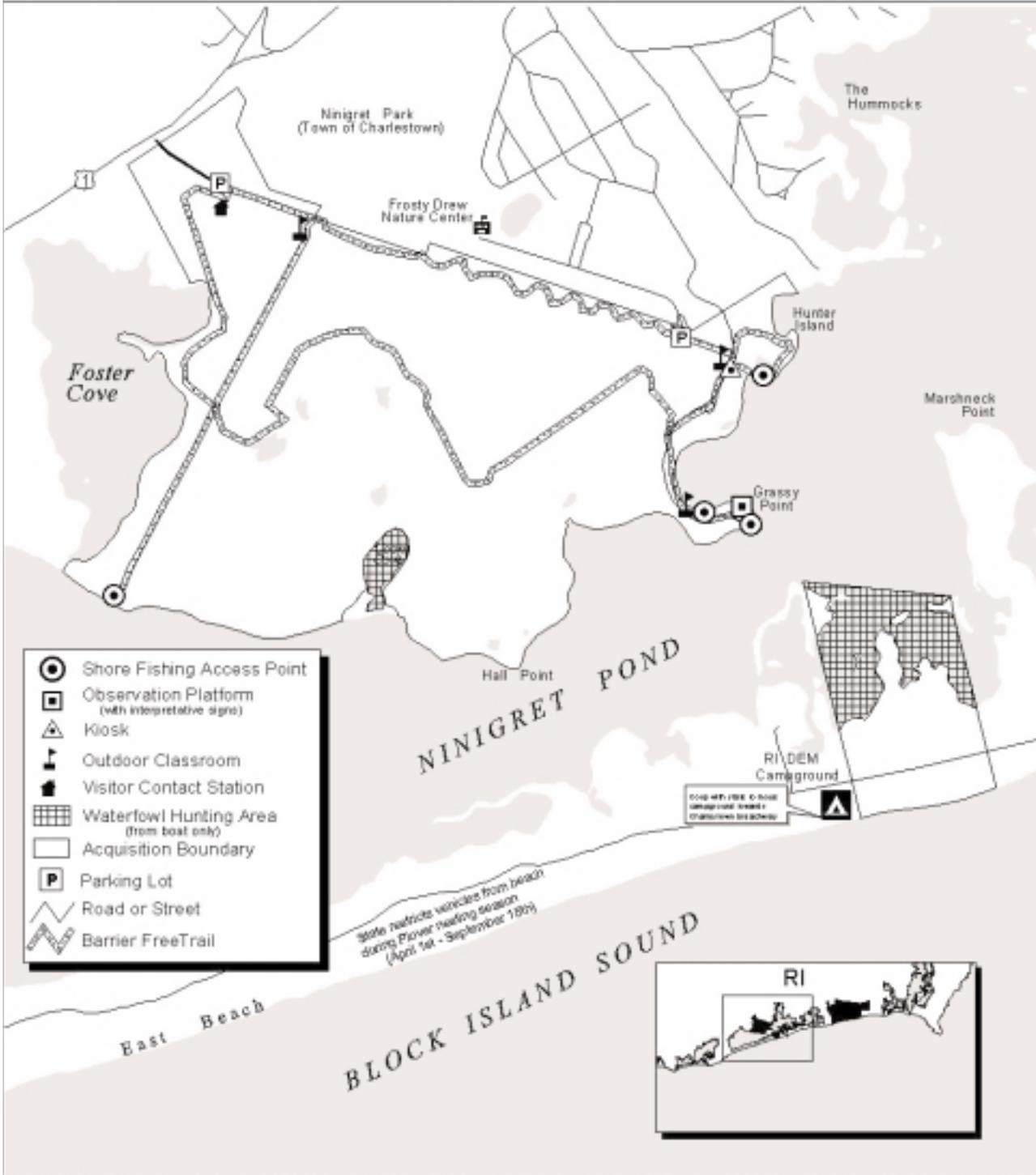
Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:25,000 Road & Hydrograph
 Aerial & GIS provided by USFWS, RI/DEM
 & RI. See Appendix B for Data Sources.
 Map prepared for Rhode Island NWR Complex
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 December 2000
 Maps to be used for project purposes.



Alternative C Proposed Public Use Ninigret National Wildlife Refuge *Rhode Island NWR Complex Comprehensive Conservation Plan*

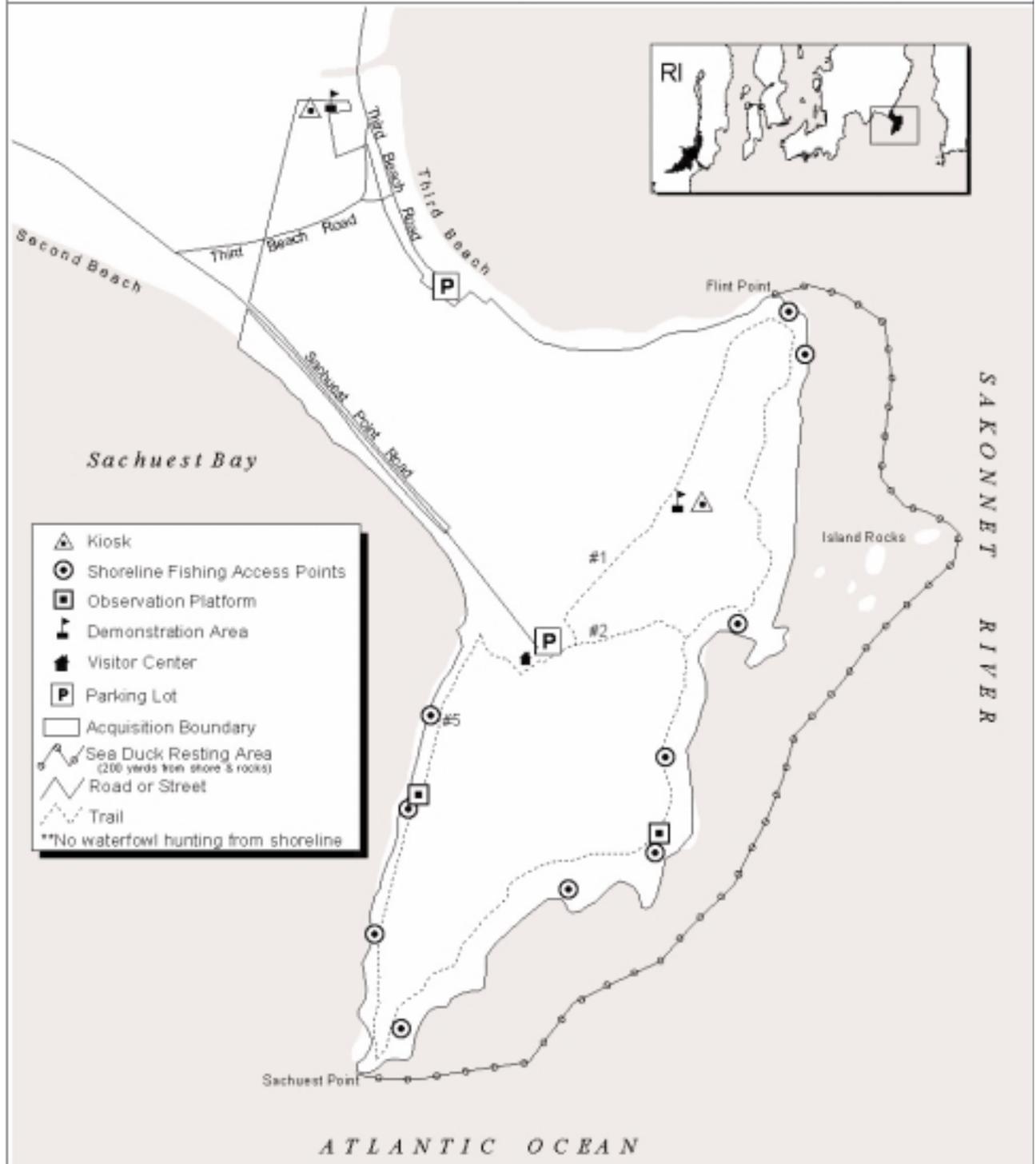


- Shore Fishing Access Point
- Observation Platform (with interpretative signs)
- Kiosk
- Outdoor Classroom
- Visitor Contact Station
- Waterfowl Hunting Area (from boat only)
- Acquisition Boundary
- Parking Lot
- Road or Street
- Barrier Free Trail

Data Sources:
 1:50,000 1:24,000 Road & Hydrographic
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 Map prepared for Rhode Island NWR Complex
 by USFWS, 1:50,000 & 1:24,000 by USFWS.
 December 2000
 1:50,000 & 1:24,000 by USFWS.



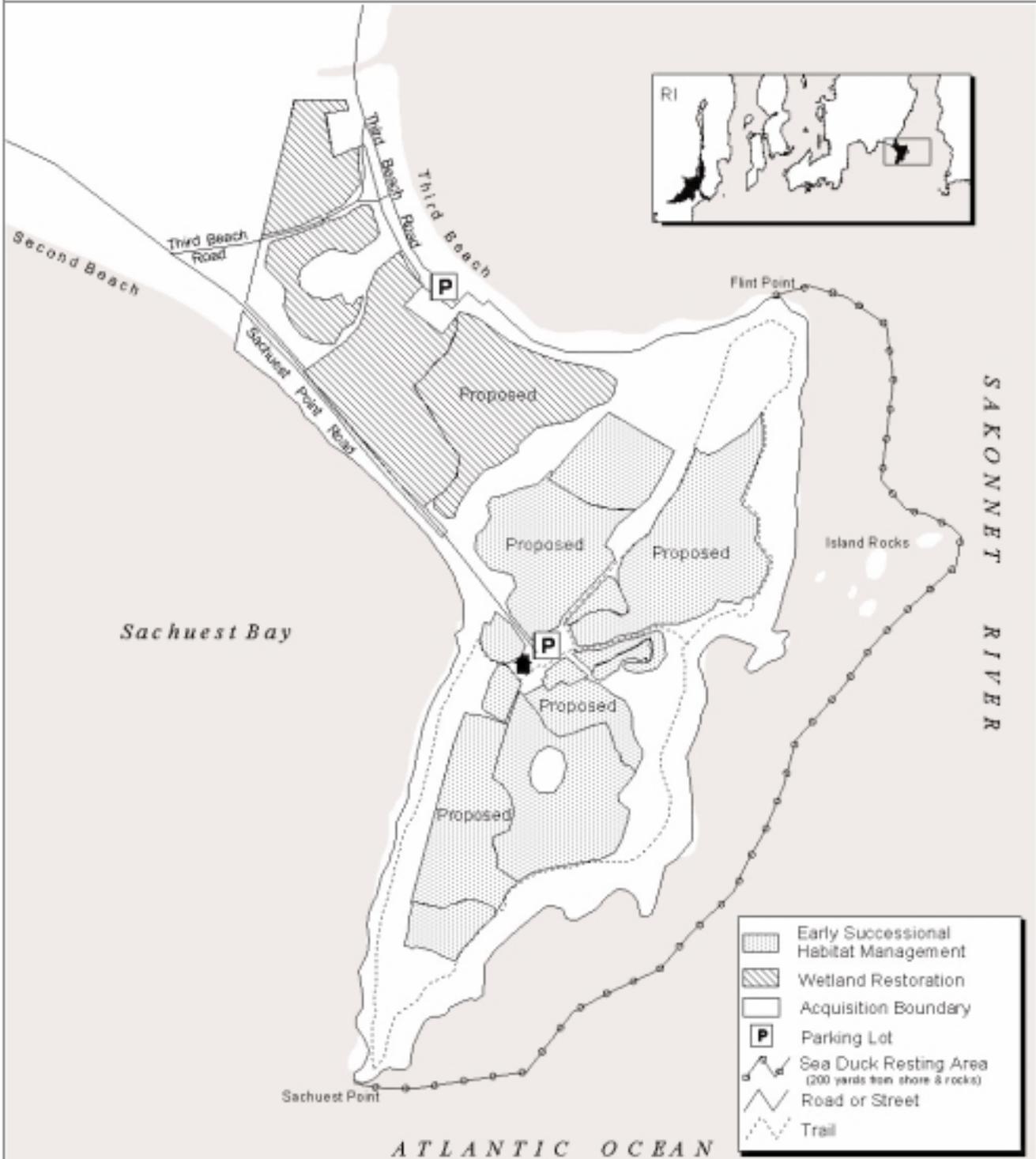
Alternative C
Proposed Public Use
Sachuest Point National Wildlife Refuge
Rhode Island NWR Complex Comprehensive Conservation Plan



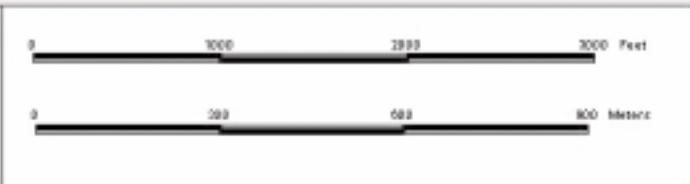
Data Sources:
 USGS 1:24,000 Roads & Hydrography
 Aerial data provided by USFWS, BIRD
 & Co., New England's Right Coastal Program.
 Map prepared for Rhode Island Wildlife
 Conservation Commission File
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Alternative C Proposed Habitat Improvements Sachuest Point National Wildlife Refuge Rhode Island NWR Complex Comprehensive Conservation Plan

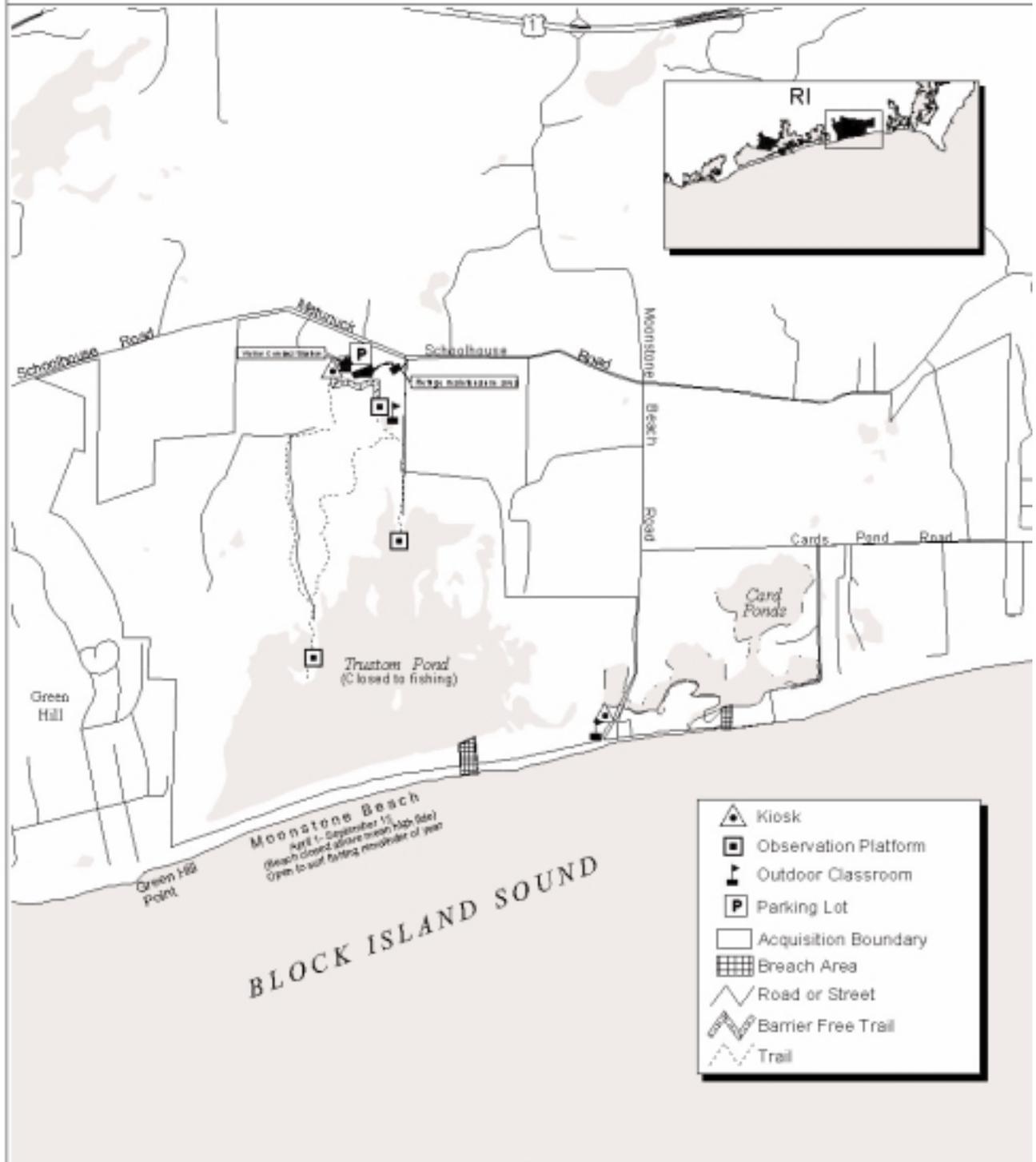


Data Sources:
USGS 1:24,000 Roads & Hydrography
Aerial Photo provided by USFWS, RI
& Co. See Exhibit IV Digital Aerial Program.
Map prepared for Rhode Island NWR Complex
Comprehensive Conservation Plan
December 2008
Not to be used for legal purposes.

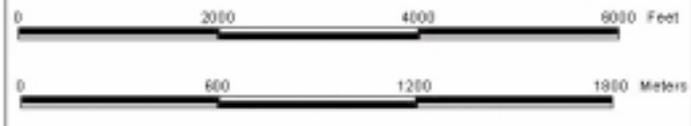


Alternative C Proposed Public Use Trustom Pond National Wildlife Refuge

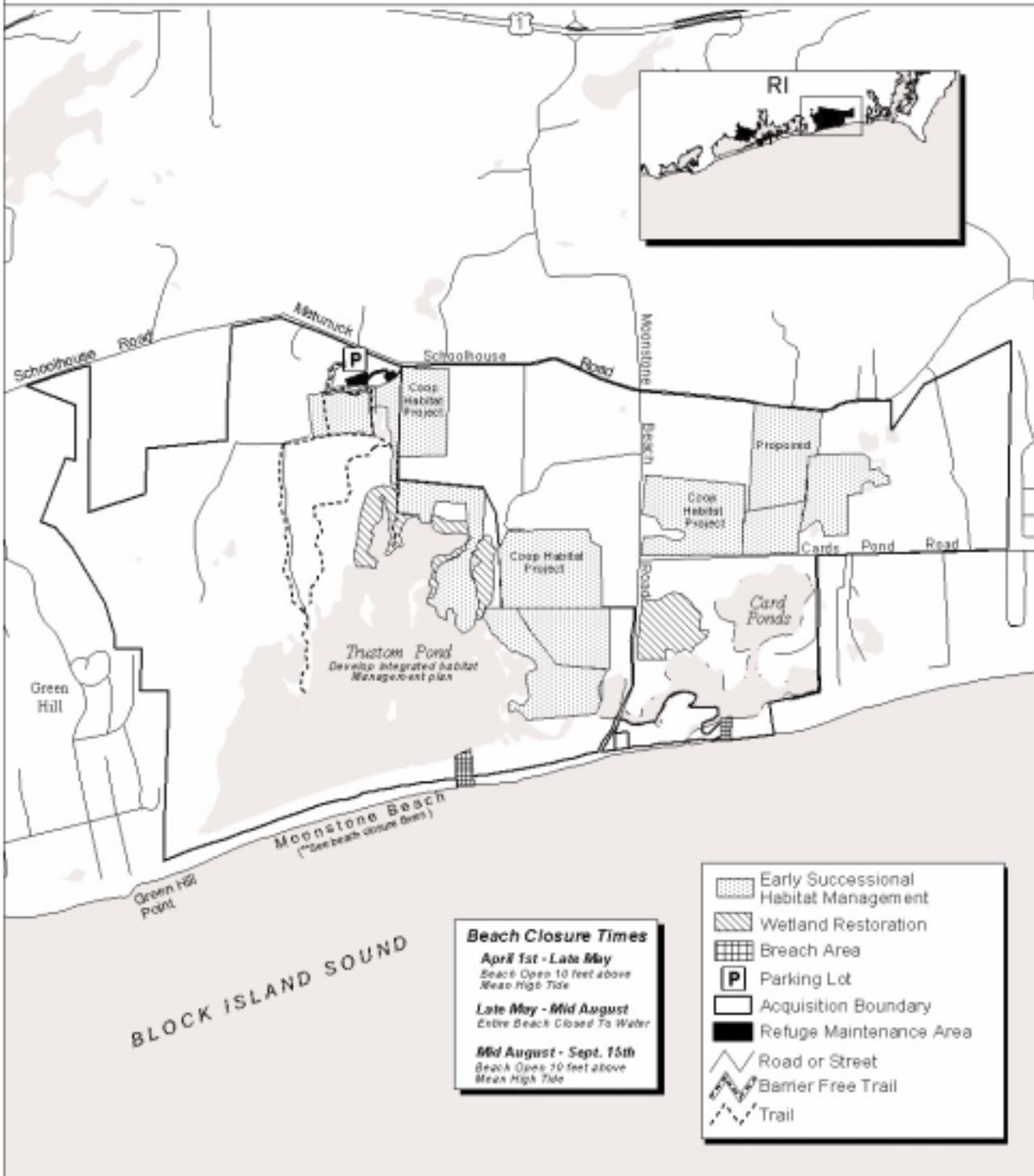
Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 USGS 1:24,000 Base & Hydrographic
 Aerial data provided by USFWS, BIRB
 & Co. New England Wildlife Coastal Region.
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan
 December 2000
 Maps to be used for public purposes.
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Alternative C Proposed Habitat Improvements Trustom Pond National Wildlife Refuge Rhode Island NWR Complex Comprehensive Conservation Plan



Beach Closure Times

April 1st - Late May
Beach Open 10 feet above Mean High Tide

Late May - Mid August
Entire Beach Closed To Water

Mid August - Sept. 15th
Beach Open 70 feet above Mean High Tide

- Early Successional Habitat Management
- Wetland Restoration
- Breach Area
- Parking Lot
- Acquisition Boundary
- Refuge Maintenance Area
- Road or Street
- Barrier Free Trail
- Trail

Data Sources:
USGS 1:24,000 Rhode Island Topography
Aerial data provided by ASPRS, RS-90
& So. New England Regional GIS Program.
Map prepared for Rhode Island NWR Complex
Comprehensive Conservation Plan.
Scale 1:12,500
Not to be used for legal purposes.
Coordinate System: NAD 83 / UTM Zone 18N



Alternative D

Without a significant compromise to the National Wildlife Refuge System's "Wildlife First" mandate and the legal purposes for which each Refuge was established, Alternative D would direct a greater commitment of resources toward enhancing the quality and increasing the quantity of compatible, priority wildlife-dependent public uses compared to Alternatives A, B, or C.

Most species and habitat management actions are the same as Alternative A (Current Management) with priority to protect piping plover nest sites, manage rare plant sites, and complete planned wetlands and grasslands restoration projects on the Refuge Complex. The principle difference compared with Alternative A species priorities are that Alternative D would focus piping plover management efforts on Refuge land only, dropping participation in the South Shore Piping Plover Program, and would implement the alternate seasonal closure on Moonstone Beach proposed in Alternative C. In addition, Alternative D would not utilize herbicides or prescribed fire as habitat management tools, eliminating potential risks to human health and safety from these activities.

This alternative would promote a highly visible Service presence, engaging visitors at either a Visitor Center or staffed Visitor Contact facility on each Refuge, or through increased environmental education and interpretive programs. In response, visitation to the Refuge Complex would be expected to increase by 25% over the next 15 years. Alternative D would implement the modified beach closure proposed in Alternative C for Moonstone Beach to allow for greater public access during early and late-summer. Also, similar to Alternative B, an increased emphasis on inventories for landbirds of concern and development of an integrated plan for Trustom Salt Pond would increase available information and improve the quality of environmental education and interpretation, wildlife observation and photography. Fishing opportunities would remain as they currently are on Block Island, Ninigret, Sachuest Point, and Trustom Pond Refuges. Better access for fishing would be provided at Chafee Refuge. New opportunities for hunting would be provided on Block Island, Ninigret, Chafee, and Trustom Pond Refuges. Nonwildlife dependent activities would be phased out by 2005, similar to Alternative B. These activities include recreational ORV driving, dog walking, swimming and sunbathing, jogging, kite flying, bicycling, roller blading, horseback riding, and bonfires.

Land acquisition and cooperative land protection would be similar to Alternative A, with 735 acres left to acquire within existing Refuge acquisition boundaries.

Involvement by volunteers, partners, and Friends of the National Wildlife Refuges of Rhode Island would improve and be strengthened as these relationships are formalized. Implementation of Alternative D would more than double current staffing levels and notably increase budget levels over what is appropriated currently.

Issue 1: Protection of endangered and threatened species and other species and habitats of special concern

How will piping plover nesting sites be protected at Trustom Pond Refuge?

Same as Alternative C.

How will piping plover nesting sites be protected at Ninigret Refuge barrier beach and active sites in the South Shore of Rhode Island?

Under Alternative D, our objective is to focus limited resources on managing piping plover on Refuge lands only. With the exception of the following change, we would manage similar to Alternative A:

- By 2002, we would drop coordination of South Shore Piping Plover Program and concentrate resources on Rhode Island Refuge Complex lands only.

How will piping plover nesting sites be protected in the Block Island Focus Area?

Same as Alternative A.

How will piping plover predators be managed on Rhode Island Refuge Complex nesting sites?

Same as Alternative A.

How can piping plover habitat be improved at Trustom Pond Refuge?

Same as Alternative A.

How will the Service coordinate with other agencies and private landowners to protect piping plover on private lands?

Same as Alternative A.

How will the Refuge Complex increase public awareness of piping plover issues through outreach and education?

Same as Alternative B.

How will the Refuge Complex ensure that piping plover management practices are based on sound science?

Same as Alternative A.

How will the Refuge Complex contribute to the protection and restoration of the American burying beetle population within the Block Island Focus Area?

Same as Alternative A.

How will the Refuge Complex protect bald eagle habitat within the Block Island Focus Area?

Same as Alternative A.

How will the Refuge Complex contribute to establishing populations of northeastern beach tiger beetles in the South Shore of Rhode Island?

Same as Alternative A.

How will the Refuge manage habitat for black duck at Chafee and Trustom Pond Refuges?

Same as Alternative A.

How will the Refuge protect wintering harlequin duck at Sachuest Point Refuge?

Same as Alternative A.

How will waterfowl concentration areas be managed on the Refuge Complex?

Same as Alternative B.

How will important marsh and wading bird habitat areas be protected on the Refuge Complex?

Same as Alternative A.

How will least tern nesting sites be protected on the Rhode Island Refuge Complex?

Same as Alternative A.

How will the Service protect and improve feeding and staging shorebird concentration areas along the South Shore of Rhode Island and on Block Island?

Same as Alternative A.

How will the Refuge Complex protect and manage other landbirds of management concern on the Rhode Island Refuge Complex?

Same as Alternative B.

How will the Refuge Complex protect seal haul-out areas on Refuge lands?

Same as Alternative A.

How will the Refuge Complex improve anadromous fish habitat in Pettaquamscutt Cove (Narrow River), Trustom Pond, and the Wood-Pawcatuck Rivers?

Same as Alternative A.

How will the Refuge Complex protect amphibian and reptile populations and habitats on Refuge lands?

Same as Alternative A.

How will Refuge staff protect and manage rare plant habitats on the Rhode Island Refuge Complex?

Same as Alternative A.

Issue 2: Restoration and maintenance of coastal sandplain natural communities, including grasslands

Where will Refuge staff restore grassland communities on the Rhode Island Refuge Complex?

Same as Alternative A.

How will grassland restoration be implemented on the Rhode Island Refuge Complex?

Under Alternative D, our objective is to continue to restore grassland areas as identified in Alternative A, only we would minimize any potential risk to human health and safety. Specifically we would:

- By 2002, implement grassland restoration projects using mechanical or biological treatments only; eliminating any potential risk to human health and safety from prescribed fires and chemical treatments.

How will the Refuge Complex promote grassland restoration on private lands?

Same as Alternative B.

Issue 3: Management of the beach strand ecological community

How will Refuge staff contribute to the protection and restoration of beach strand communities?

Same as Alternative A.

Issue 4: Management of Trustom Salt Pond

How should Trustom and Cards Ponds be managed to improve water quality and benefit species of concern?

Same as Alternative B.

Issue 5: Protection and restoration of wetlands

How will Refuge staff restore and promote wetland ecosystems on the Rhode Island Refuge Complex?

Same as Alternative A.

Issue 6: Improving water quality in the Narrow River

How will Refuge staff contribute to improving and protecting the water quality of Pettaquamscutt Cove and the Narrow River Watershed?

Same as Alternative A.

Issue 7: Control of invasive, non-native, or overabundant plant and animal species

How will Refuge staff control non-native and/or invasive plant species on the Refuge Complex?

Under Alternative D, our objective is to continue to control invasive, non-native species in areas identified in Alternative A, only we would minimize any potential risk to human health and safety. Specifically we would:

- By 2003, control 5 acres of invasive plant/year through use of mechanical and biological treatments only to reduce all risk to human health and safety from prescribed fire and chemical treatments.

How will Refuge staff manage non-native, invasive mute swan on the Rhode Island Refuge Complex to reduce adverse effects on waterfowl and water quality?

Same as Alternative A.

How will Refuge staff manage deer populations within and adjacent to the Refuge Complex?

Under Alternative D, our objective is to minimize deer impacts on Refuge habitats and contribute to reducing risks of Lyme disease and vehicle collisions in the South County area by reducing deer herds through a quality hunt program. Specifically we would:

- By 2005, develop a quality deer hunt program, including barrier-free opportunities, administered by RI DEM under Refuge regulations on Block Island and Ninigret Refuges, the Foddering Farms tract on Chafee Refuge, and on Trustom Pond Refuge, in areas not deer restricted from hunting.
- Refuge regulations would meet or exceed state regulations on deer hunting, and archery only areas would be a priority consideration, to ensure that the safety of Refuge visitors, Ninigret Park users, and adjacent landowners would not be compromised.
- We would first prepare a Federal Register Notice and an annual hunt plan.

Issue 8: New Refuge Complex land acquisition and cooperative protection of sensitive habitat sites

How will the Service's land acquisition program be expanded to protect species and habitats of special concern?

Same as Alternative A. Additional details are provided in the “Land Protection Alternative Development” section earlier in this chapter.

Issue 9: Access to credible natural resource information on the Refuge Complex to ensure management decisions are based on the best available science

How will Refuge staff establish needs for and begin to collect baseline biological information across the Rhode Island Refuge Complex?

Same as Alternative A.

How will Refuge staff insure that biological integrity of natural communities will be maintained on the Rhode Island Refuge Complex?

Same as Alternative A.

Issue 10: Management of public use and access (except hunting and environmental education which are discussed as separate issues below)

How will Refuge staff improve Visitor Services?

Same as Alternative B.

How will Refuge staff improve existing partnerships with groups involved in or influencing public use activities on the Refuges?

Same as Alternative B.

What fishing opportunities will be available at Block Island, Ninigret, and Trustom Pond Refuges?

Same as Alternative A.

What fishing opportunities will be available at Chafee Refuge?

Same as Alternative B.

What fishing opportunities will be available at Sachuest Point Refuge?

Under Alternative D, our objective is to maintain the existing fishing opportunities, but reduce potential safety risks to other visitors from spear fishing. In addition to actions identified under Alternative A, we would implement the following:

- By 2001, develop and enforce a regulation requiring spear fishing gear to be unloaded and encased while on Refuge land. This would minimize any safety hazard and reduce intimidation to other Refuge visitors. Monitor this activity to evaluate its impact on other wildlife-dependent uses.
- By 2005, construct a barrier-free fishing platform, if technically and economically feasible.

What kind of interpretive opportunities will be available throughout the Rhode Island Refuge Complex?

Same as Alternative B.

What kind of wildlife observation and photography opportunities will be available at Block Island Refuge?

Under Alternative D, our objective is to further provide quality opportunities for wildlife observation and photography. Specifically, we would:

- By 2008, cooperate with partners to construct at least one “barrier free” photography blind and observation platform. We would also develop watchable wildlife pamphlets and species checklists.
- By 2009, cooperate with partners to designate a trail to Beane Point from North Light through West Beach, and link to trail systems off-Refuge. This trail would be seasonally closed at Beane Point during wading bird nesting season, approximately May 1 to August 1.

What kind of wildlife observation and photography opportunities will be available at Ninigret, Chafee, Sachuest Point, and Trustom Pond Refuges?

Same as Alternative B.

How will nonwildlife dependent activities be managed across the Refuge Complex?

Same as Alternative B.

What priority public uses would be allowed on newly acquired Refuge lands?

Same as Alternative B.

How will the Refuge promote and cultivate the relationship with the Friends of the National Wildlife Refuges of Rhode Island?

Same as Alternative B.

Issue 11: Hunting on the Refuges

What hunting opportunities will be available at Block Island Refuge?

Under Alternative D, our objective is to create new opportunities for a quality hunting experience on Block Island.

- By 2005, we would allow RI DEM to administer a deer hunt and a pheasant hunt by permit under Refuge regulations.
- Refuge regulations would meet or exceed (i.e. be more restrictive than) state regulations to ensure the safety of Refuge visitors.
- We would first prepare a Federal Register Notice and an annual hunt plan

What hunting opportunities will be available at Ninigret Refuge?

Under Alternative D, our objective is to create new opportunities for a quality hunting experience on Ninigret Refuge.

- By 2002, we would allow waterfowl hunting, from boat only, in Coon Cove and in the marshland within the barrier beach parcel. This waterfowl hunt would be administered by RI DEM under Refuge regulations.
- By 2005, we would allow RI DEM to administer a deer hunt by permit under Refuge regulations and we would evaluate opportunities for a small game hunt.
- Refuge regulations would meet or exceed (i.e. be more restrictive than) state regulations to ensure the safety of Refuge visitors.
- We would first prepare a Federal Register Notice and an annual hunt plan

What hunting opportunities will be available at Chafee Refuge?

Under Alternative D, our objective is to create new opportunities for a quality hunting experience on Chafee Refuge.

- By 2002, we would provide a waterfowl hunting opportunity, by boat access only, administered by RI DEM under Refuge regulations. We would also evaluate the potential for temporary floating blinds if there is interest.
- Also by 2002, we would initiate a deer hunting opportunity on the Foddering Farms tract, administered by RI DEM under Refuge regulations.
- Refuge regulations would meet or exceed (i.e. be more restrictive than) state regulations to ensure the safety of Refuge visitors.
- We would first prepare a Federal Register Notice and an annual hunt plan

What hunting opportunities will be available at Sachuest Point Refuge?

For the reasons identified in Alternative A; we would not provide a hunting opportunity on Sachuest Point Refuge.

What hunting opportunities will be available at Trustom Pond Refuge?

Under Alternative D, our objective is to improve the existing opportunity and create new opportunities for a quality hunting experience on Trustom Pond Refuge.

- By 2001, we would continue to allow RI DEM to administer a waterfowl hunt on the 20 upland acres maintained in cool season grasses. We would implement the 1999 Habitat Management Plan developed by RI DEM for this tract.

- By 2005, we would allow RI DEM to administer a deer hunt, by permit, under Refuge regulations. We would also evaluate opportunities to provide for small game hunting. The former Audubon tract (151 acres) would continue to be deed-restricted from hunting.
- Refuge regulations would meet or exceed (i.e. be more restrictive than) state regulations to ensure the safety of Refuge visitors.
- We would first prepare a Federal Register Notice and an annual hunt plan

Issue 12: Increased opportunities for environmental education

What curriculum-based environmental education opportunities will be available at Block Island Refuge?

Under Alternative D, we would build on the objective stated for Alternative B and create an additional outdoor classroom program. Specifically we would:

- By 2006, develop an outdoor classroom site on the Refuge featuring the barrier beach and the island's unique ecology.

What curriculum-based environmental education opportunities will be available at Chafee, Ninigret, Sachuest Point, and Trustom Pond Refuges?

Same as Alternative B.

Issue 13: Ability to provide staffing, operations, and maintenance support needed to accomplish goals and objectives

How does the proposed alternative change the funding requirements of the Rhode Island Refuge Complex?

Successful implementation of Alternative D relies on our ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Under Alternative D, our objective would be to obtain the funding outlined below:

- By 2003, funding would increase substantially, commensurate with the staffing and project lists outlined for Alternative D in Appendices F and H.
- Full implementation of this alternative would require an annual increase of \$509,000 for salary, and a total increase of \$9.2 million for RONS projects (not including recurring costs), and \$3.8 million in MMS projects.

What will be the staffing needs of the Rhode Island Refuge Complex?

As stated above for funding, successful implementation of Alternative D relies on our ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Under Alternative D, our staffing objective would be as follows:

- 24 full time personnel, and
- 11 seasonals
- Some staff would be assigned to Sachuest Point and Block Island Refuges as depicted on the staffing charts (Appendix H), the rest would be stationed at the current office pending completion of the new Refuge Complex Headquarters/Visitor Center.

How will the Service ensure the protection of cultural resources on the Refuge Complex?

Under Alternative D, our objective is to improve cultural resource identification, interpretation, and site protection over current management.

- By 2005, we would implement a partnership agreement with the Narragansett Indian Tribal Council to facilitate cooperation on environmental education and interpretation, to improve our understanding of the context for these resources, and to increase site identification and protection.
- Also by 2005, we would develop an environmental education curriculum for use in local schools emphasizing local resources, their identification, protection, and management. Interpretive materials would also be developed in conjunction with the Visitor Centers and trails.

Issue 14: Increased visibility of the U.S. Fish & Wildlife Service

How will the Refuge increase Service visibility and recognition of the National Wildlife Refuge System?

Same as Alternative B.

Issue 15: Need for improved facilities

What facilities are needed to improve administrative and visitor contact services on the Rhode Island Refuge Complex?

Under Alternative D, our objective is to dramatically improve administrative and visitor services and opportunities for visitor contact. In addition to the actions proposed in Alternative B, we would:

- By 2010, work with partners to construct a small interpretive/visitor contact facility for Block Island Refuge (location may be off-Refuge).

When will the Rhode Island Refuge Complex improve road and entry signs to meet national standards and better serve visitors?

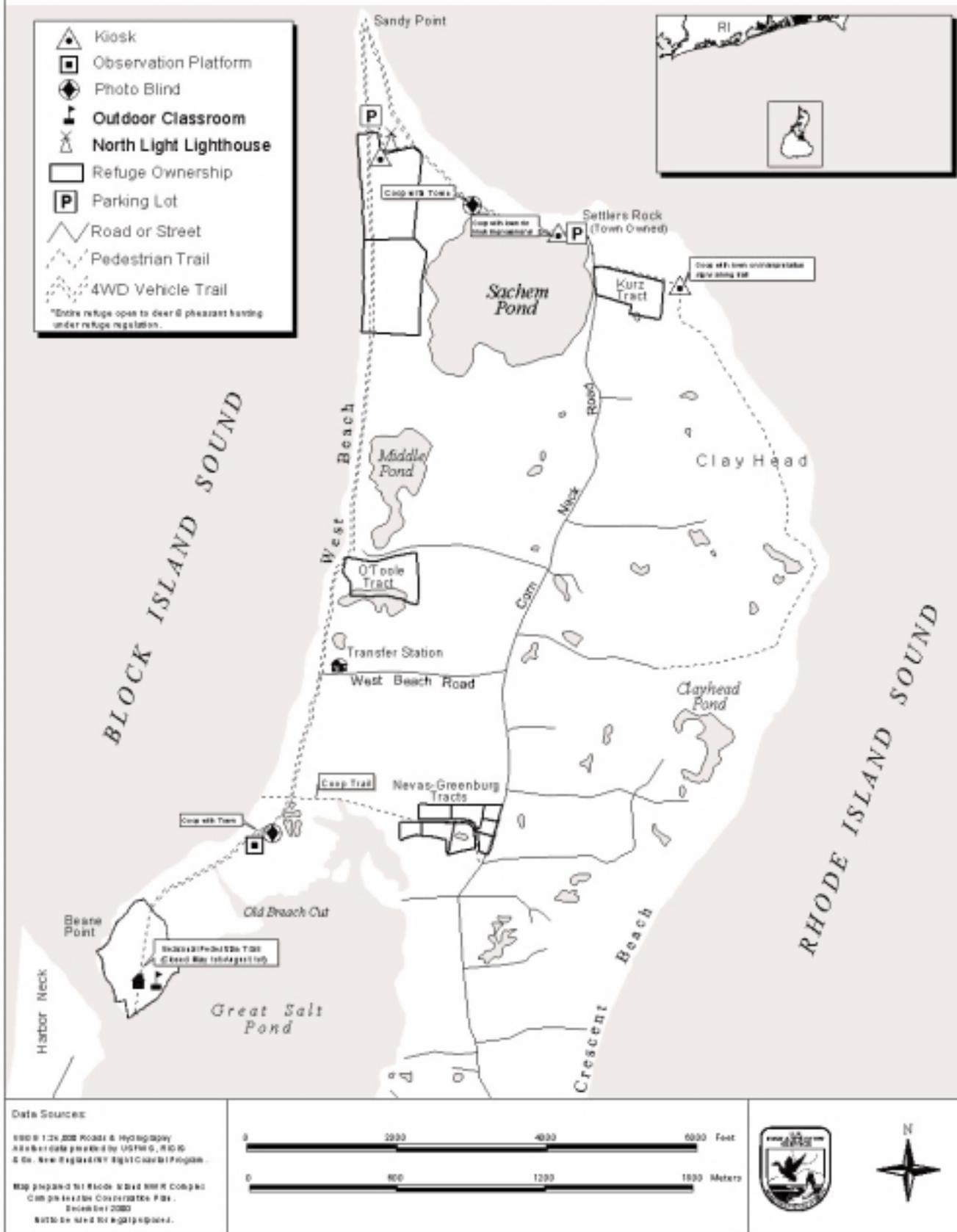
Same as Alternative B.

Alternative D

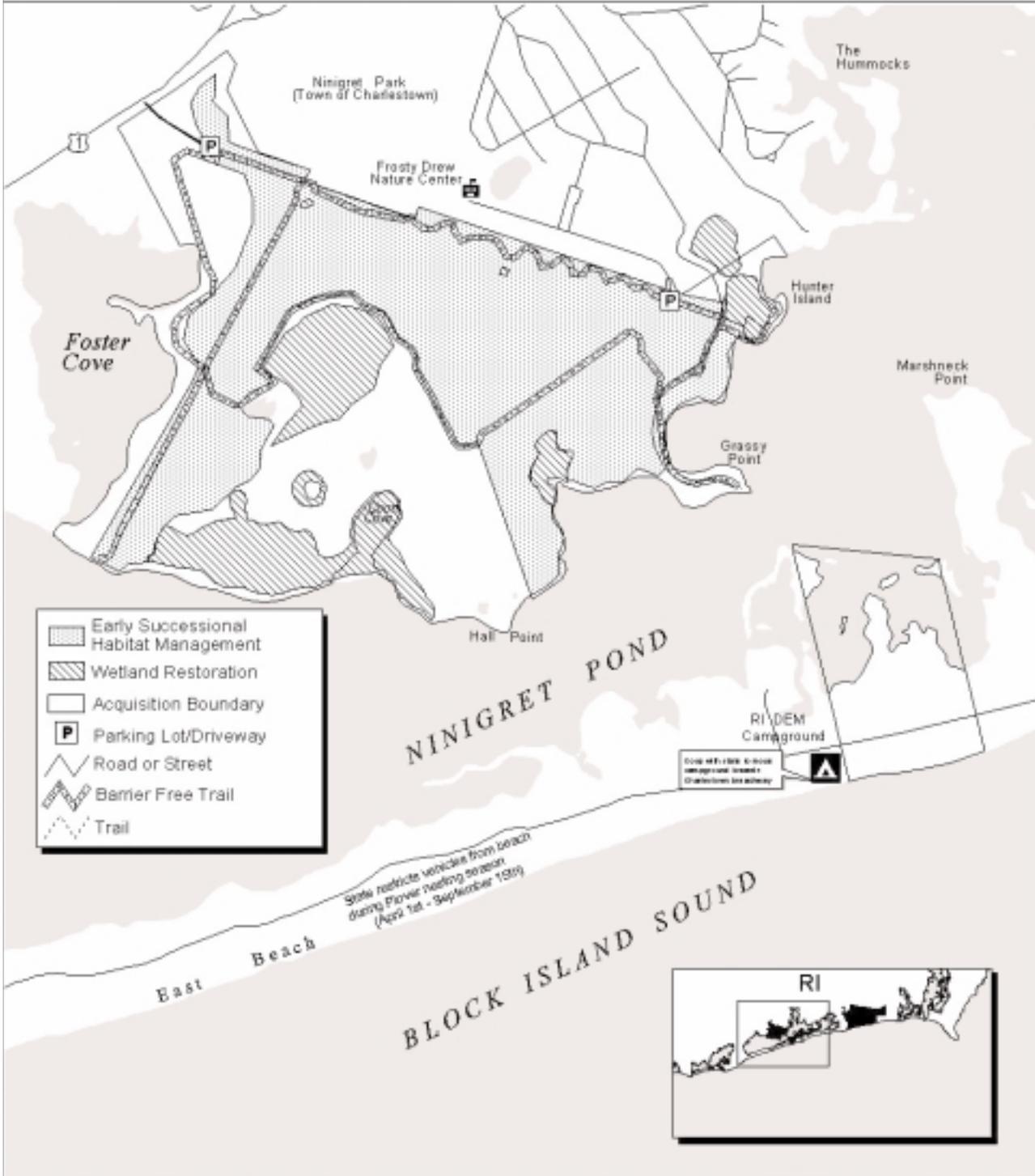
Proposed Public Use/Habitat Improvement

Block Island National Wildlife Refuge

Rhode Island NWR Complex Comprehensive Conservation Plan



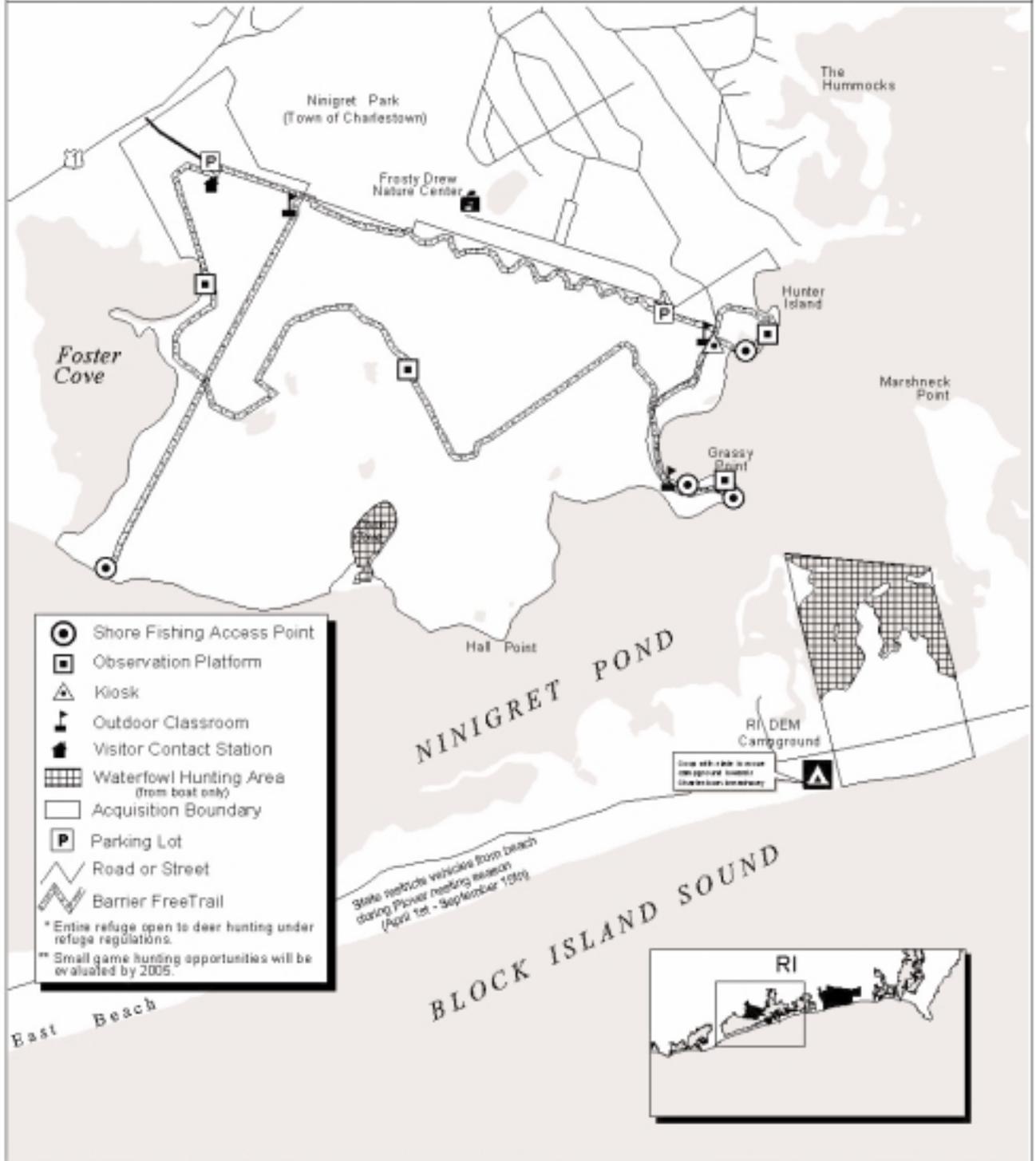
Alternative D Proposed Habitat Improvements Ninigret National Wildlife Refuge *Rhode Island NWR Complex Comprehensive Conservation Plan*



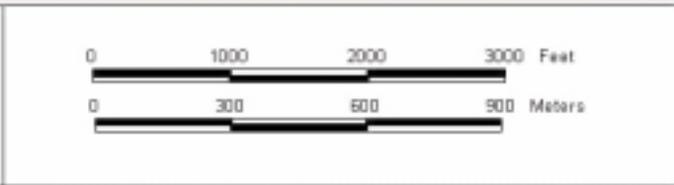
Data Sources:
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 1:50,000 1:24,000 provided by USFWS, 1:50,000
 & 1:24,000 by USGS National Wetlands
 Inventory
 Map prepared for Rhode Island NWR Complex
 Comprehensive Conservation Plan
 October 2000
 Not to be used for legal purposes.



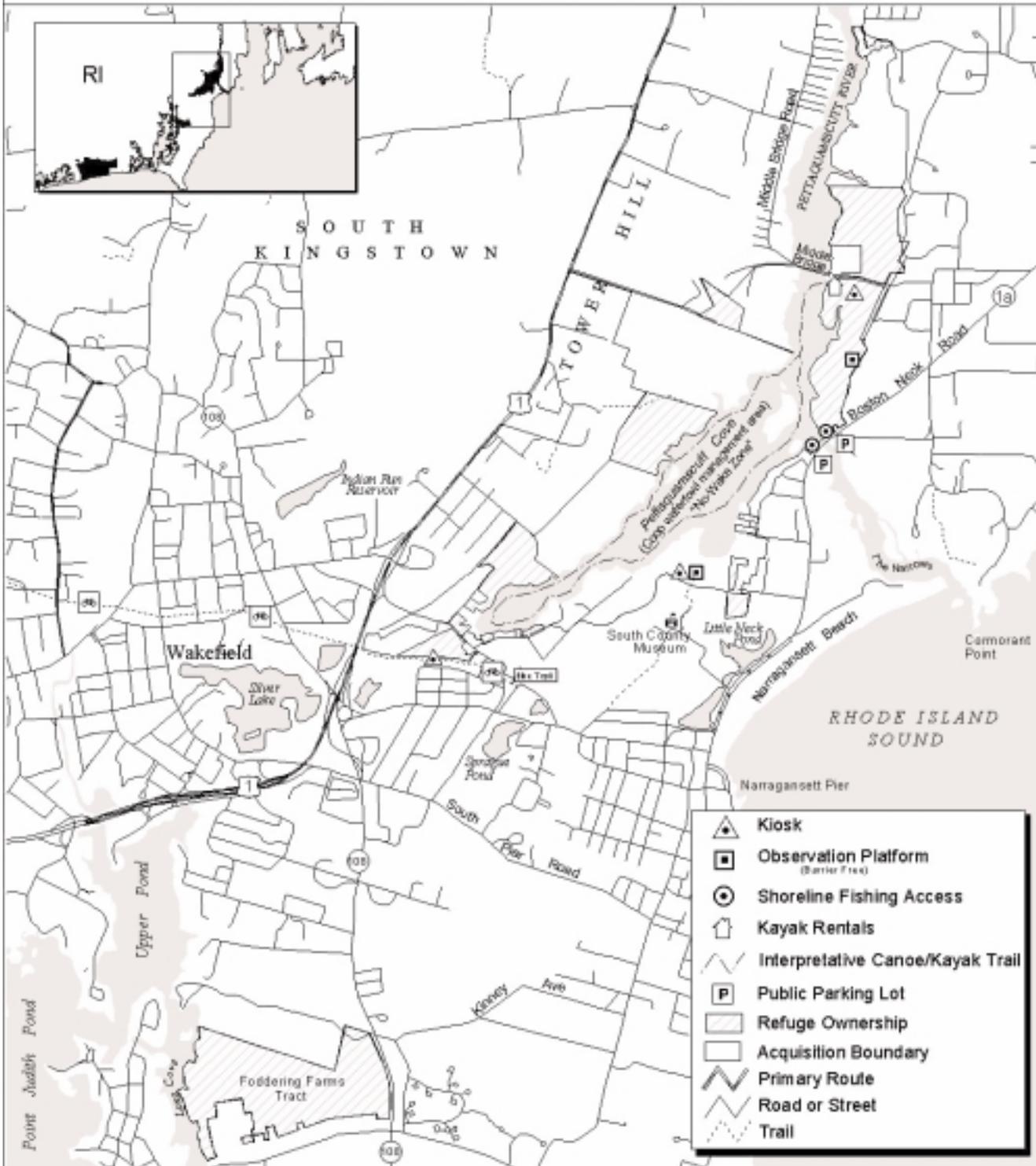
Alternative D Proposed Public Use Ninigret National Wildlife Refuge *Rhode Island NWR Complex Comprehensive Conservation Plan*



Data Sources:
 USGS 1:24,000 Bathymetry
 NOAA 1:250,000 provided by USFWS, FWS
 & Co. See Appendix B for Coastal Features.
 Map prepared for Rhode Island NWR Complex
 by the USFWS, Coastal Features
 December 2000
 8000 1000 2000 3000 Feet



Alternative D Proposed Public Use/Habitat Improvement John H. Chafee National Wildlife Refuge Rhode Island NWR Complex Comprehensive Conservation Plan

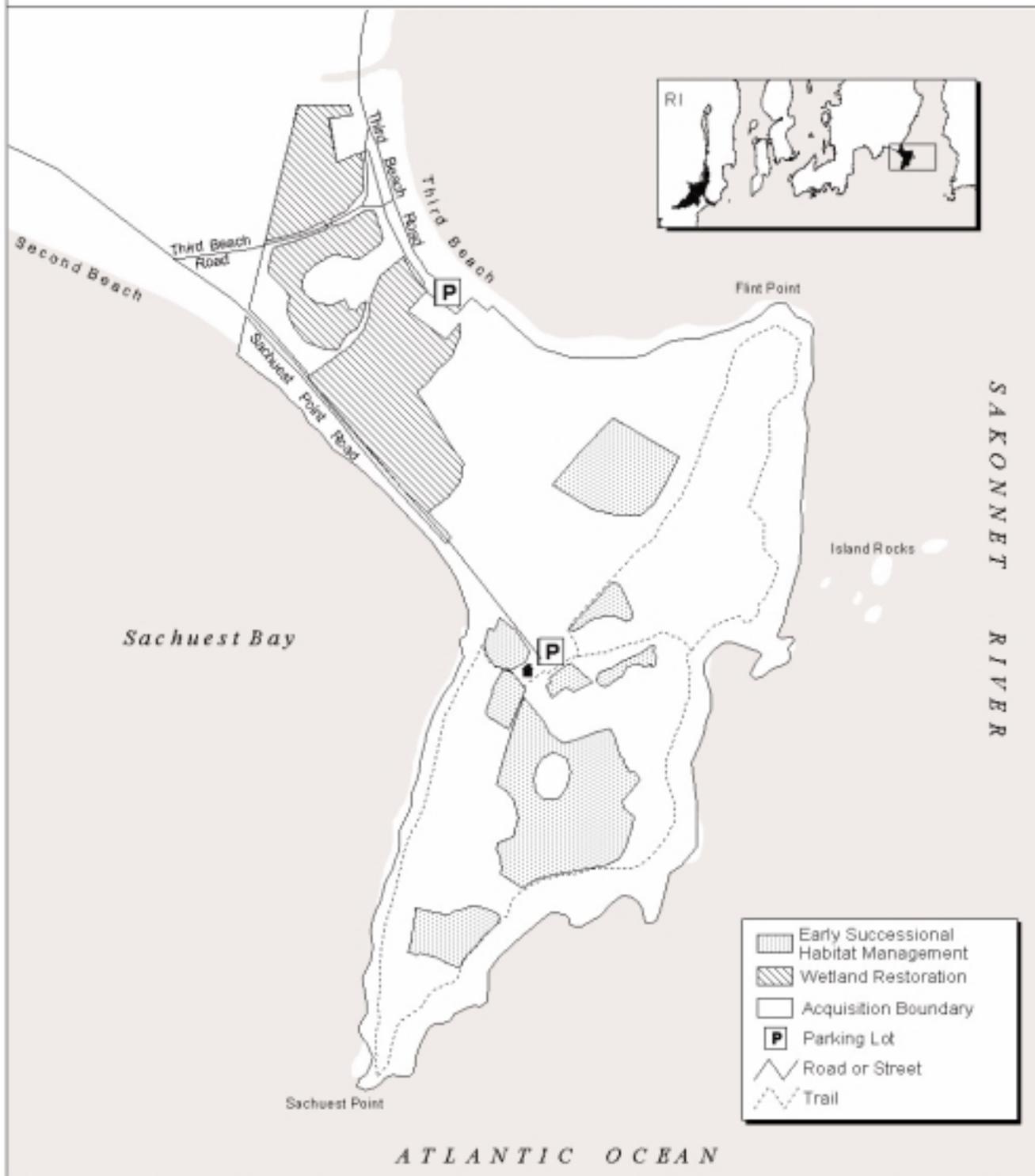


Data Sources:
USGS 1:24,250 Roads & Hydrography
All other data provided by USFWS, RIDIS
& So. New England/NY State Coastal Program.

Map prepared for Rhode Island NWR Complex
Comprehensive Conservation Plan.
December 2000
Not to be used for legal purposes.



Alternative D Proposed Habitat Improvements Sachuest Point National Wildlife Refuge Rhode Island NWR Complex Comprehensive Conservation Plan

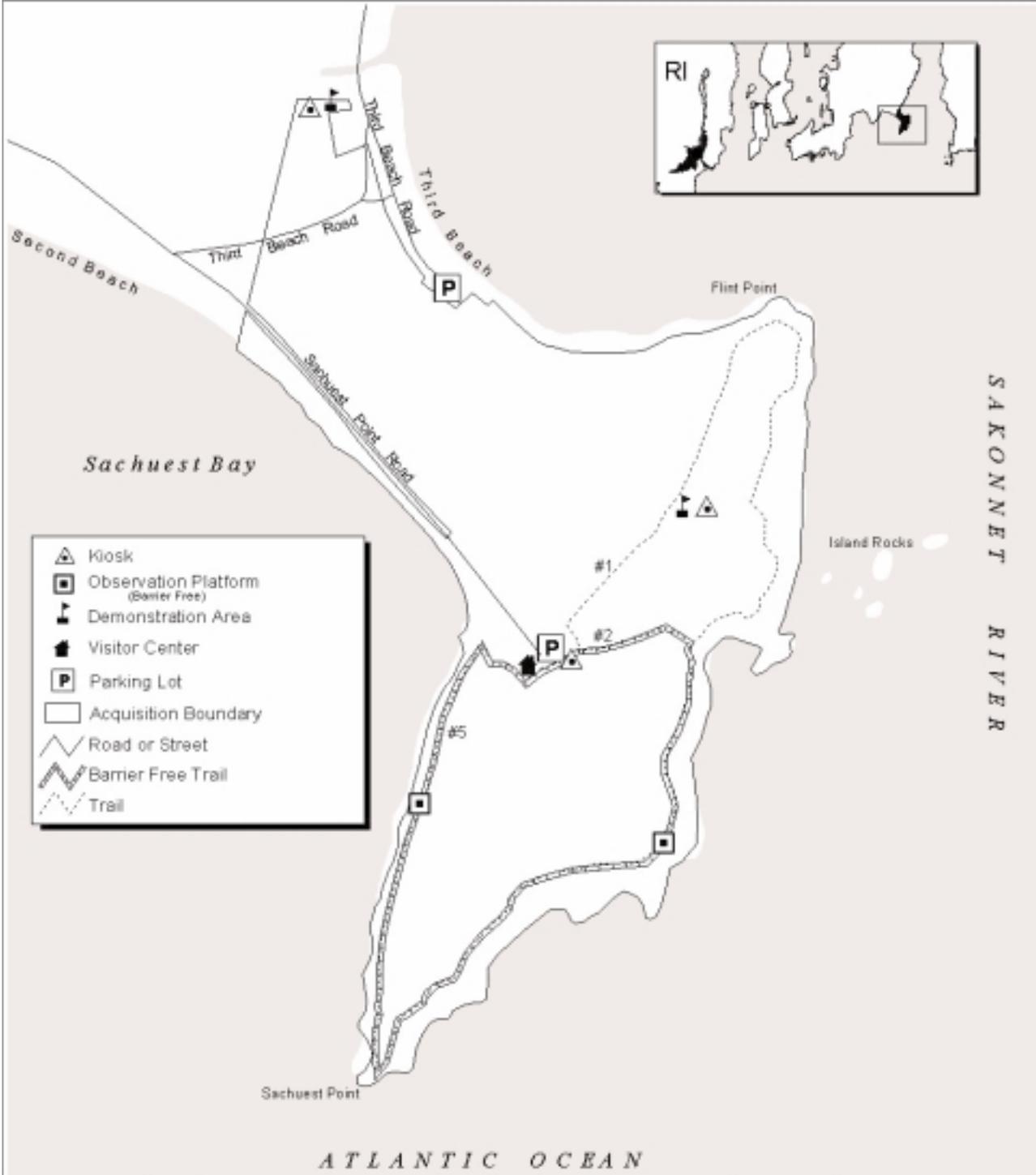


Data Sources:
USGS 1:24,000 Bathymetry
Aerial data provided by SDFRS, RI019
& So. New England/NY Light Coastal Program.

Map prepared for Rhode Island NWR Complex
Completed by Coastal Services, Inc.
December 2000
Not to be used for legal purposes.



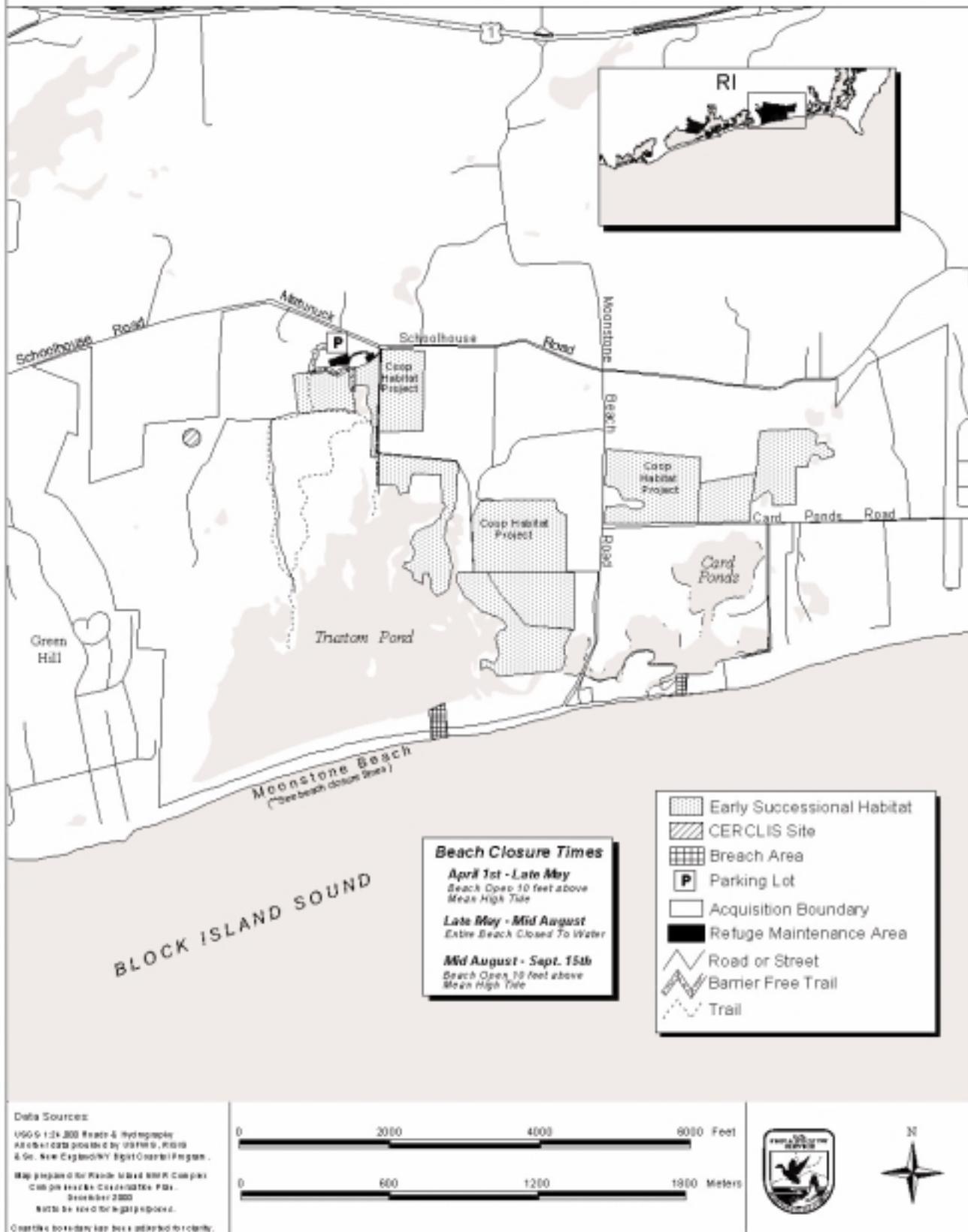
Alternative D Proposed Public Use Sachuest Point National Wildlife Refuge *Rhode Island NWR Complex Comprehensive Conservation Plan*



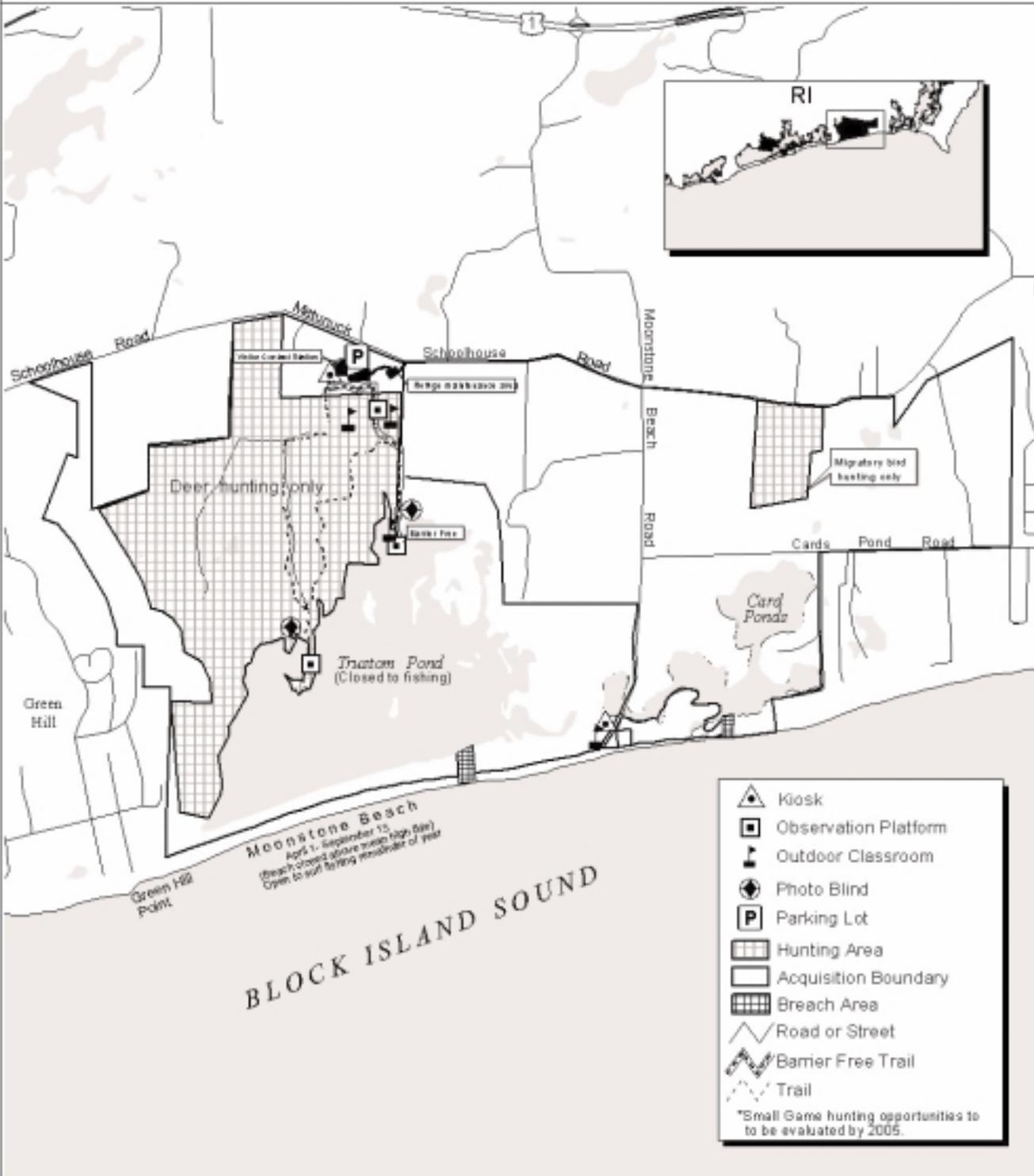
Data Sources:
USGS 1:24,000 Roads & Hydrographic
All other data provided by USFWS, BIRD
& Se. New England's Right Coastal Program
Map prepared for Rhode Island NWR Complex
Comprehensive Conservation Plan
Scale 1:2500
North is used for alignment.



Alternative D Proposed Habitat Improvements Trustom Pond National Wildlife Refuge Rhode Island NWR Complex Comprehensive Conservation Plan



Alternative D Proposed Public Use Trustom Pond National Wildlife Refuge Rhode Island NWR Complex Comprehensive Conservation Plan



Data Sources:
 2000 1:24,000 Road & Hydrographic
 Aerial Data provided by USFWS, RIGIS
 & So. New England NY State Coastal Program.
 Map prepared for Rhode Island NWR Complex
 Cooperative Conservation Plan
 December 2000
 Not to be used for legal purposes.
 Coastal boundary line box added for clarity.



Alternatives or Actions Considered, but Eliminated From Further Consideration

Custodial Management

This alternative would minimize refuge management, providing only those activities mandated by policy or regulation, such as fire suppression, non-native or invasive plant control, providing for public health and safety, or protecting threatened or endangered species. Public use opportunities would be drastically reduced or eliminated on some refuges, commensurate with reduced staffing and budgets. The Service presence on refuges and in the communities would be minimal. Under this alternative, resource issues would not be resolved, nor would the Complex achieve its goals.

During our public scoping, a few responses called for a much-reduced Service presence or no presence at all, primarily because it imposed on their nonwildlife-dependent activities. Some were specifically concerned about our law enforcement presence on Moonstone Beach during the piping plover nesting season. They objected to armed Service personnel patrolling the beach. While we received these comments from a few individuals, we did not otherwise hear recommendations for a custodial approach to management. Therefore, we determined it did not need detailed evaluation.

Relaxing Public Use Restrictions on Moonstone Beach, Trustom Pond Refuge

Several individuals, either at our CCP Open Houses or in Planning Workbook responses, wanted the Service to relax restrictions on public use at Moonstone Beach. The beach is closed to public use above the mean high tide line from April 1 to September 15 to protect nesting piping plover and least tern. Managing public use on Moonstone Beach has had a colorful history since the first restrictions were imposed in 1982. (See the discussion in Chapter 2, “Trustom Pond Refuge, Piping Plover Program” on the evolution of management strategies.)

Federal laws and Service policy require refuges to maximize protection for threatened and endangered species. The Revised Recovery Plan for the Atlantic Coast Population of Piping Plover states, “On many national wildlife refuges, where protection of wildlife is the paramount purpose of Federal ownership, complete closures of plover habitat during the breeding season should be continued.” (USFWS 1996, p. 71) The Recovery Plan requires that all management actions at breeding sites strive to maximize occupancy, survival, and productivity in order to ensure recovery. It has established goals for sustaining nesting carrying capacity at each site and for achieving a 5-year average nest fledgling rate of 1.5 chicks per pair.

Piping plover nesting at Trustom Pond has only reached its estimated nesting carrying capacity of 10 pairs in 1997 and 1998, and the average 5-year productivity rates are below the Recovery goal of 1.5 fledged chicks per pair. In summary, piping plover have not been consistently nesting at capacity, nor have chicks fledged at a rate to achieve recovery goals. We determined that an alternative relaxing public use restrictions on Moonstone Beach during the nesting season would conflict with our mandates to protect threatened and endangered species, and need not be developed in detail.

Completely closing Moonstone Beach during plover nesting season, in cooperation with RI CRMC

Both the Trustom Pond Refuge Master Plan (1988) and the Piping Plover Compatibility Determination for Trustom Pond Refuge (1990) proposed working with the RI CRMC to close the entire Moonstone Beach, including the area below the mean high tide line, to public use during the piping plover nesting season (c. April 1 to Sept 15). For reasons stated below, this action was never implemented and will not be further considered in this document.

At Moonstone Beach, the Service has jurisdiction only above the mean high tide line. The remainder of the shoreline, below mean high tide, is "...considered by common law to be public land, held in trust for the public by the State." (RI CRMC 1993) The Rhode Island Constitution specifically protects citizens' rights to fish from the shore, to gather seaweed, to leave the shore to swim in the sea, and to walk along the shore (Article 1, Section 17). Access along the shore has been a common expectation and legal right for generations of Rhode Islanders (RI CRMC 1993). Shoreline restrictions are a very contentious issue.

We have received little support from State agencies to close the beach entirely, in part because public demand is so great for access to the shoreline. However, in support of Service concerns with public use, the State does not identify Moonstone Beach in its publication, "Public Access to the Rhode Island Coast" (1993). Some State representatives have suggested that closing Moonstone Beach below the mean high tide may require an amendment to the State Constitution (Brandwine 1999).

While piping plover and least tern nesting habitat generally occurs above the mean high tide line, the intertidal area is critical for feeding. The alternatives developed in detail in this draft CCP/EA propose additional research on piping plover feeding activity in the intertidal zone, propose increasing foraging habitat along Trustom Pond and Cards Pond shorelines through management, and propose working with RI CRMC to close the intertidal zone during part of the nesting season (late May to mid-August). For these reasons, we determined that recommending closure of the entire Moonstone Beach to all public use activities throughout the nesting season need not be developed in detail at this time. Should future events warrant our reconsideration, nothing in this CCP/EA would preclude implementing this strategy at a later time.

Non-lethal Predator Management Only

We now manage predators on the Complex only in conjunction with protecting piping plover and least tern, just prior to and during the nesting season. Trapping is only one of several tools used. Others include predator exclosures, auditory and visual intimidation techniques, scent marking, planting egg deterrents, electric fencing, and visitor outreach and education on how not to attract predators.

Between 1985 and 1992, we intermittently used an live-trapping and relocation program that live-trapped predators on the Complex and relocated them elsewhere in the State. In 1993, the State passed a law prohibiting relocation of most of the predators targeted in the plover program (e.g., racoon, skunk, fox), primarily due to a concern about spreading rabies. At that time, the Complex began a lethal trapping program.

Loss of piping plover and least tern adults and chicks to predators continues to be the primary reason for nest failure and chick mortality (Rhode Island Piping Plover Restoration Project Report 1999). Foxes, coyotes, feral cats, Norway rats, domestic dogs, skunks, racoons, gulls, crows, and grackles are all fairly common, documented predators on nesting beaches. Piping plover on some beaches, like Napatree Point, recently have had very low to zero productivity due to fox predation.

It is important to recognize that the targeted predator populations far exceed their historic levels, primarily due to the loss of even larger predators such as mountain lion and gray wolf. Also, many of these species have adapted very well to human habitation and, combined with the loss of large predators, their populations have exploded outside the range of natural fluctuations.

Complex refuges were established primarily to protect migratory birds and threatened and endangered species. The Revised Atlantic Coast Piping Plover Recovery Plan (1996) promotes predator removal through whatever responsible means necessary, including trapping. An integrated, adaptive predator management program, using all the management tools at our disposal, is essential to fulfilling those mandates. For these reasons, we determined that an alternative that precludes removing predators would contradict our mandate to protect threatened and endangered species, and need not be developed in detail.

RONs and MMS Projects Associated with each Alternative

Appendix F presents the Refuge Operating Needs (RONs) project list and the Maintenance Management System (MMS) list for each alternative. The costs for each project are based on our current knowledge of its scope. Full implementation of each alternative assumes funding for RONs and MMS projects over the next 15 years.

Staffing Charts Associated with each Alternative

Appendix H presents each alternative's staffing charts. Full implementation of each alternative assumes meeting staffing levels over the next 15 years.

Compatibility Determinations

The National Wildlife Refuge System Improvement Act of 1997 states that no refuge use or activity may be allowed unless it is first determined to be compatible. It defines a compatible use as one which, in the sound professional judgement of the respective Refuge Manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes for which each Refuge was established. It further defines sound professional judgement as a decision that is consistent with principles of fish and wildlife management and administration, is supported by available science and resources, and complies with the law.

Compatibility determinations have been completed or recertified for the six priority, wildlife-dependent public uses proposed in Alternative B. We have included those determinations in Appendix E for public review and comment. Any stipulations within the compatibility determinations are included as part of Alternative B.

Two existing compatibility determinations for ongoing research would remain in effect for all alternatives. Conditions have not changed under which the original determinations were made so they are still considered valid. These research projects are being conducted by the University of Rhode Island and involve a Moonstone Beach profile study on Trustum Pond Refuge and a Lyme bearing tick study on Ninigret Refuge. These compatibility determinations are available upon request from the Refuge office.

Appendix E also presents an Interim Compatibility Determination that will guide public use management on newly acquired lands. The Interim Compatibility Determination will remain effective until new information becomes available or until a formal compatibility determination is completed.

While Alternatives A, C, and D do not require formal compatibility determinations at this time according to policy, for all practical purposes, the environmental consequences described in Chapter 4 for these alternatives depict potential compatibility conflicts.

Monitoring

Monitoring and evaluation for this CCP will occur at two levels. The first level, which we refer to as implementation monitoring, responds to the question, “Did we do what we said we would do, when we said we would do it?” Annual implementation monitoring will be achieved by using the checklist in Appendix I (under Alternative B, The Proposed Action).

The second level of monitoring, which we refer to as effectiveness monitoring, responds to the question, “Are the actions we proposed effective in achieving the results we had hoped for?” Or, in other words, “Are the actions leading us toward our vision, goals, and objectives?”

Effectiveness monitoring evaluates an individual action, a suite of actions, or an entire resource program. This approach is more analytical in evaluating management affects on species, populations, habitats, and predetermined indicators of ecosystem integrity and the socio-economic environment, using evaluation criteria established in step-down, individual project, or partnership plans identified in each alternative.

Each of these plans would have a monitoring and evaluation component. Ecosystem teams could establish further monitoring and evaluation criteria. Alternatives B and C would establish a comprehensive effectiveness monitoring program through development of a Complex Monitoring and Inventory Plan. The following projects or programs are listed in order of priority for establishing monitoring and evaluation strategies: the piping plover program, grasslands restoration, wetlands restoration, and public use (including the impacts to the natural resource programs).

Complex staff would be responsible for completing the monitoring under the time frames and conditions called for in respective plans. Effectiveness monitoring would provide the basis for an adaptive management response.



Green frog
USFWS photo

Environmental Consequences

Part 1: Refuge Complex Consequences

- Air quality
- Socio-economic factors
- Staffing and budget
- Contaminant Sites

Part 2: Individual Refuge Consequences

- Block Island Refuge
- Ninigret Refuge
- Chafee Refuge
- Sachuest Point Refuge
- Trustom Pond Refuge

Cumulative Impacts

Short Term Use versus Long Term Productivity

Unavoidable Adverse Impacts

Irreversible and Irretrievable Commitments of Resources

This chapter predicts the impacts of implementing the management actions and strategies proposed under each of the four alternatives in Chapter 3 - *Alternatives*. Where detailed information is available, we present a scientific and analytic comparison among alternatives. In the absence of detailed information, we make comparisons based on professional judgment and experience. We predict impacts for all alternatives, including Alternative A (Current Management), the baseline for comparing the other alternatives.

We also discuss in more detail the environmental resources described in Chapter 2 - *Description of the Affected Environment*, associated with the goals and key issues identified in the Chapter 1 section - *Purpose of and Need for a CCP*. Within our 15-year planning horizon, we identify direct and indirect impacts. Beyond the 15-year horizon, we give a more speculative description of direct, indirect, and cumulative impacts. **Table 4-1** summarizes environmental consequences for each alternative.

Please keep in mind the small size of the Refuge Complex in geographic proportion to its larger ecological region when reviewing proposed management actions and our description of their impacts. The Refuge Complex now comprises 1,710 acres—a relatively small land base compared to the entire Connecticut River/Long Island Sound Ecosystem or the breeding ranges of most of Rhode Island's species. We generally describe impacts on a relatively fine geographic scale, for example, within a refuge. In actuality, the Refuges are not isolated, and we may not have recognized the influence of the surrounding landscape on the duration and extent of impacts. We may have overstated both positive and negative impacts within their larger geographic context.

Although the Refuges are small, the actions we propose take proactive steps toward achieving conservation goals in a larger geographic context. The majority of proposed actions are consistent with the State, Regional, Ecosystem Team, and watershed conservation plans identified in Chapter 1, and make positive, albeit incremental, contributions to their larger landscape goals.

In the absence of reliable, quantitative information, we use the terms “positive”, “negative”, and “neutral” as qualitative measures of how an action could impact resources of concern. A positive impact implies an action we predict will enhance or benefit the resources under consideration and help accomplish goals and objectives over the short (< 15 years) or long (> 15 years) term. A negative impact implies an action we predict will be detrimental to a resource over the short or long term, thereby failing to achieve goals and objectives. A neutral impact means either (a) there would be no discernible effect, positive or negative, on the resources under consideration; or (b) predicted positive and negative effects would cancel each other out.

We have arranged this chapter's discussion of resources in the same sequence we discussed them in Chapter 2. Resources we describe on a larger geographic scale in Chapter 2, like air quality and socio-economic factors, are discussed in Part 1 as they relate to the entire Refuge Complex. Following that discussion, we describe predicted impacts on the remaining resources in Part 2, by Refuge.

Air Quality

Poor air quality contributes to the acidification of lakes, streams, and soils, the eutrophication of lakes, decreased plant reproduction, increased accumulation of metals and organics in the food chain, and “regional haze” (Porter 1999, pers. com). Refuge operations impact air quality primarily through the management-ignited prescribed fire program. Prescribed fires directly impact air quality in three principal ways: decreased visibility, increased particulates, and increased pollutants.

Alternative A (Current Management)

Alternative A proposes management-ignited, prescribed fires to facilitate grasslands and wetlands restoration, manage for threatened and endangered species, reduce hazardous fuels and debris, or control invasive plant species. Typically, we use fire in combination with mechanical, biological, and chemical treatments to meet a stated objective. Alternative A would implement the following planned projects using prescribed fire over the next 15 years. Consider these figures annual maximums.

- 345 acres/year of grassland restoration and maintenance;
- 15 acres/year of wetlands restoration and maintenance;
- 5 acres/year of invasive plant control, and;
- 3 acres/year (est.) for boundary maintenance or debris removal around structures and facilities.

In April 1997, Refuge Complex staff completed an environmental assessment (EA) of a wildfire suppression and fire program. All alternatives in this draft CCP/EA incorporate the decision of that Fire EA. It stipulates no maximum acreage limit for prescribed fire, but sets forth required conditions under which prescribed fires would occur; to minimize or eliminate impacts on visibility and to reduce the potential for adding particulates and pollutants from prescribed fires. The following measures would minimize the impacts from prescribed fires to air quality.

1. We will identify and address smoke-sensitive areas in an Annual Prescribed Fire Burn Plan. The wind vector selected will transport smoke and other particulate emissions away from sensitive areas.
2. We will conduct burns only when visibility exceeds 4 miles, when the fire weather forecast indicates the presence of an unstable airmass, and when mixing heights are greater than 1500 feet and ventilation rates (mixing rates ~ transport wind speed) are 3000 or greater. A minimum of 2 m.p.h. of wind speed is required.
3. We will conduct no burning if any government agency has issued an air pollution health advisory, alert, warning, or emergency for the area surrounding the Refuges.
4. We will use backing and flanking fires when possible to minimize particulate emissions.

As stated in Chapter 2, ozone levels are the primary air quality concern in Rhode Island. The State is dealing with this problem through programs to reduce automobile emissions. While Refuge visitors' automobiles directly contribute emissions, their contribution is negligible compared to that of urban and industrial centers within a 100-mile radius. Most Refuge visitors are either local residents, or summer vacationers who are in the area already. Most visitors will travel less than 20 miles to the Refuges or Visitor Center from their permanent or vacation residence. We should note that we predict visitation to the Refuge Complex to increase by 10 percent, or an additional 35,000 visitors, as a direct result of the new Visitor Center and planned improvements to the existing visitor service programs (O'Neill 1999, pers com). We expect most of the additional visitation to occur during the summer and fall months, when families seek an alternative to the beaches.

While difficult to quantify, it is important to recognize that Refuge vegetation and wetlands offset pollution levels by acting as pollution filters (Porter 1999). Given that fact, and since no Class I air quality areas would be affected, and assuming the prescribed fire stipulations above, adverse direct and indirect impacts on air quality from Alternative A should be of relatively short duration and light intensity.

Alternative B (The Proposed Action)

The types of air quality impacts and concerns stated for Alternative A are the same for this alternative. However, Alternative B has a slightly increased potential to adversely affect air quality because we would use prescribed fire on more acres proposed for habitat restoration. The following planned projects, with their potential use of prescribed fire, would occur under Alternative B. Consider these figures annual maximums.

- 500 acres/year total of early successional restoration and maintenance (includes the existing restoration projects on Ninigret and Trustom Pond Refuges and the future possibility of 155 additional acres among Sachuest Point, Chafee, and Block Island Refuges);
- 135 total acres/year of wetlands restoration and maintenance (includes the future possibility of 20 acres at Chafee Refuge);
- 25 acres/year of invasive plant control; and
- 10 acres/year (est.) for boundary maintenance or debris removal around structures and facilities.

Under Alternative B, we expect visitation to increase approximately 20 percent over current levels (70,000 additional visitor use days) within the next 15 years as a result of the new Visitor Center and respective increases in priority public use programs across the Refuge Complex. Auto emissions related to refuge visitation would increase commensurately, to a level greater than Alternative A.

The greater acreage of habitat restoration proposed in Alternative B would, over the long term, provide more land with an increased ability to filter out pollutants. Alternative B would also implement the Fire EA, with its stipulations on environmental conditions for using prescribed fire as a management tool.

Considering the increased use of prescribed fire and increased visitation versus the increased acreage of restored vegetation and improved wetlands, we predict Alternative B would result in adverse air quality direct and indirect impacts of short duration and intensity, but at a level greater than Alternative A.

Alternative C

The impacts would be the same as those described for Alternative B.

Alternative D

Alternative D does not propose the use of prescribed fire for any restoration or habitat project. General broadcast burning would not occur, reducing potential risks to human health or safety from smoke emissions. However, we could burn as many as 3 acres/year to remove debris piles or remove brush along boundaries. These smaller, debris-pile fires would occur only under the stipulations in the Fire EA.

We predict visitation would increase approximately 25 percent over current levels (87,500 additional visitor use days), due to the Visitor Center and the significant expansion in priority public use services and programs across the Refuge Complex. Refuge-related automobile emissions would increase proportionately more than projected for Alternatives A, B, or C. The additional emissions contributed would be relatively low, compared with urban and industrial centers elsewhere in Rhode Island. Overall however, because no prescribed fires would occur, Alternative D would impact air quality the least of the four alternatives.

Summary

Alternative D impacts air quality the least, followed by Alternative A, and then equally, Alternatives B and C. No Class I air sheds would be impacted, and all alternatives would comply with the Clean Air Act.

Socio-Economic Factors

Alternative A (Current Management)

Alternative A would result in relatively small changes to the local socio-economic environment affected by the Refuge Complex. Property tax revenue, refuge revenue sharing payments, cost of community services, and tourism revenue would all be impacted as described below. Other impacts on the social environment, as they relate to public use opportunities, are discussed for each Refuge in Part 2 of this chapter.

Continuing our acquisition of the 735 acres now within approved land acquisition boundaries would reduce property tax revenue to towns, since the land would become non-taxed Federal property. We predict the greatest loss in towns where properties zoned residential become Refuge lands. Most of those 735 acres lie in South Kingstown, and are zoned either residential or farm/forest/open space.

However, positive adjustments to annual refuge revenue sharing payments, and savings in the cost of community services would partially offset the loss in property tax revenue. The cost of community services includes police, fire and school facilities, and other infrastructure needs.

Under our current land acquisition strategy, refuge revenue sharing payments to the towns of South Kingstown and Narragansett would increase the most. Approximately 735 acres have been approved for our purchase from willing sellers within these two towns. Assuming we acquire these acres at an estimated average market value of \$20,000/acre in South Shore towns, and assuming the 1998 refuge revenue sharing payment amount (\$4.70 per \$1,000 of market value), an additional \$69,000/year in refuge revenue sharing payments would be distributed between the towns of South Kingstown and Narragansett after we have purchased all land within the acquisition boundary.

While difficult to quantify for these towns alone, in general, land acquired for the Refuge System has a positive economic impact through savings in the cost of community services. A cost of community service analysis is one way to compare a town's revenues with its expenditures at a specific point in time. It also determines the costs and financial contributions of various types of land use. A study commissioned by the Southern New England Forest Consortium, Inc. determined the average expense/revenue ratio for Rhode Island towns: \$1.20 for residential, \$0.42 for commercial/ industrial, and \$0.38 for open space (Commonwealth Research Group, 1995).

In other words, for every dollar of revenue from the residential sector, Rhode Island towns spent an average \$1.20 on residential public services. For every dollar of revenue from the commercial/industrial sector, towns spent an average of \$0.42 on that sector. In the forest/farm/open space sector, they spent \$0.38. In summary, lands in the forest/farm/open space sector provide the greatest positive expense/revenue ratio.

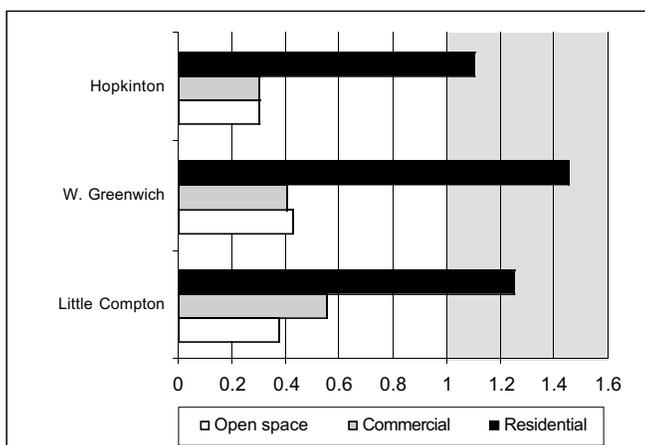


Figure 4-1. Cost per dollar of revenue from open space, commercial, and residential development in Rhode Island.

We also should note that, although commercial development appears positive, "...the ratio does not take into account other costs associated with commercial/industrial development...the potential to attract new residential development, increased traffic and noise pollution, and the loss of open space land for filtering pollutants in water and air, and to provide recreation opportunities." (Commonwealth Research Group 1995)

That study also found that the fastest growing towns in Rhode Island, like those on the South Shore, suffered greater than average losses when their land was developed into residential areas, compared to towns with more stable populations. This is primarily because the speed and intensity of development makes it difficult to maintain adequate infrastructure and public services. Rhode Island is sixth in the Nation in its rate of land development (www.state.ri.us/dem/demrep99/open 2000).

Small towns with national wildlife refuges realize positive socio-economic benefits through increased private property values, estimated at 1 percent to 4 percent of market value. That real estate premium generally applies to properties adjacent to refuge lands (Readybough 1999, pers com). Further, refuge lands provide aesthetic benefits to Rhode Islanders by maintaining open space and the rural character of the South Shore.

Rhode Islanders have consistently passed local and State bond measures to protect open space. In 1999, Governor Lincoln Almond proposed another \$50-million bond measure for 2000 to protect 35,000 acres of open space, recreation and wildlife habitats by 2010. On March 1, 2000, an article in *The Providence Journal* summarized a recent survey of Rhode Island residents. The article stated, "...Rhode Islanders consistently valued environmental concerns more than economic growth or transportation...safeguarding natural and historic resources all ranked above attracting new business and having enough good jobs." Although we have not quantified the Refuges' contribution to these benefits, there has been very little public opposition to our continuing to acquire land.

On Block Island, the situation is similar to the mainland. Most Block Island residents support land protection, evidenced by their passing a 3-percent property transfer tax and creating the Block Island Land Trust to administer the fund (1987). Island residents were responding to the dramatic increase in new construction on the island during the mid-1980's, which continues in today's strong economy.

Block Island residents have not opposed Service land acquisition in the past. The Nature Conservancy in particular has encouraged Service land acquisition on the island.

Another positive socio-economic benefit the Refuges provide is their contribution to ecologically based tourism in South County. Tourism associated with the natural and historic resources of Rhode Island is a \$2.1 billion/year industry (www.state.ri.us/dem/demrep99/open). Attendance at State parks and beaches increased by 15 percent between 1998 and 1999. In 1999, nearly 6 million visitors enjoyed State parks and beaches. The South County Tourism Council has recently begun marketing the Refuges as part of a public "Greenway." Its brochures identify and describe alternative recreational opportunities provided by the Refuges, State and local parks, and other open space. Ann O'Neill, of the South County Tourism Council, suggests that the potential to attract visitors will continue to grow (O'Neill 1999, pers com).

We predict the greatest potential of Alternative A to directly impact the local socio-economic environment is through the development of a new Visitor Center for the Refuge Complex. While we have not yet selected the site, one selection criteria is to locate a site easily accessible from Route 1 in South County, where more than 2 million visitors enjoyed South County Tourism Council festivals and events in 1998 (O'Neill 1999). While we do not expect the Visitor Center to be a trip destination in and of itself, we do predict it would prompt many visitors to spend an additional day on the South Shore.

It is difficult to quantify the increased direct and indirect contributions to the local economy from visitors. Five of the six priority public uses, fishing, wildlife observation and photography, and environmental education and interpretation, occur on Block Island, Ninigret, Sachuest Point and Trustom Pond Refuges. Chafee Refuge limits public use to fishing only. These activities spin off economic benefits that have not been specifically quantified. Hunting, the sixth priority public use, occurs only on 20 acres at Trustom Pond Refuge. That Canada goose hunt typically accommodates approximately 14 hunters.

If we can expect an additional 35,000 annual visitors who spend an estimated \$20/day in pursuit of activities associated with their Refuge trip, that amounts to approximately \$700,000 in additional revenue each year to affected communities. We derived the \$20/day average estimated expenditure from our publication, "Banking on Nature" (July 1997), which states that the non-consumptive recreation expenditure per day on Refuges in the Northeast (Region 5) averaged \$20/day for residents and nonresidents.

Alternative B (The Proposed Action)

Compared to the other alternatives, Alternative B would result in the second greatest direct positive change to the local socio-economic environment. Its proposed land acquisition (approximately 2,465 acres more than Alternative A), coupled with the new Visitor Center, and the expansion of the quality and quantity of visitor services on all Refuges, would lead to substantial increases in refuge revenue sharing payments, reduced cost of community services, increased property values, more protected open space, and increased visitor revenue to local economies.

Inclusive of the acres predicted for Alternative A, the 3,200 acres of new acquisition would result in an estimated increase of \$291,000/year in refuge revenue sharing payments to southern Rhode Island towns, including \$47,000 to the Town of New Shoreham. More South Shore towns, in addition to those now receiving payments, would realize that benefit as well, since we propose acquisition throughout southern Rhode Island. These payments partially offset the loss in property tax revenue, since Federal lands are non-taxable.

We predict the construction of a Visitor Center and the increase in family-oriented environmental and interpretive opportunities on all five Refuges will increase overall visitation by 20 percent, attracting an estimated 70,000 additional visitors each year. These visitors, spending an average \$20/day, would contribute \$1.4 million in additional annual revenue to affected communities. The annual Canada goose hunt on 20 acres at Trustom Pond Refuge would continue, with only a negligible contribution to the local economy. All the Refuges would remain open to saltwater fishing.

Less tangible positive benefits would also be realized from increased land acquisition. During public scoping, many residents expressed support for acquisition to maintain the area's rural character. While we predict the increased land acquisition proposed in Alternative B would contribute to maintaining the rural aesthetic character; we have no analysis that quantifies the value of that benefit.

One controversial aspect of land acquisition is the price we have paid for land on Block Island. Land on the island has cost up to \$100,000/acre over the last 10 years. Alternative B proposes to increase our land acquisition on Block Island by an additional 100 acres at an estimated cost of \$7 million. Our cost estimate assumes we would not necessarily pay \$100,000/acre on all 100 acres, but would acquire some of that land through means like donations or conservation easements. These are some of the highest prices paid for land in the National Wildlife Refuge System. However, we have continued to support acquisition and cooperative land protection on Block Island because of its significant, unique biological values, and because the dramatic increase in development over the last 10 years has underscored the need for expeditious action. In fact, the Town of New Shoreham commissioned a build-out analysis, which determined that at the present rate, the island would be built out within the next 12 years.

We noted the unique natural resources on Block Island in our report entitled “Northeast Coastal Areas Study” (1991). [Block Island is] “...one of the most important migratory bird habitats on the East Coast...[as it]...provides a critical link or stepping stone in the migration of many birds, particularly raptors and passerines, between southern New England and eastern Long Island, and points north and south.”

The increased land protection in Alternative B would be the most effective way of directly benefitting the diversity of natural resources on Block Island, protecting threatened and endangered State and Federal species, and maintaining open space.

The acres targeted for acquisition from willing sellers lie within the Block Island Focus Area on the northern half of the island. The proposed 100 acres, in addition to the 102 acres of existing Refuge lands, would make us one of the largest landowners in the Focus Area. This may raise concerns with some island residents who are engaged in activities we would not consider a priority public use. However, we predict most island residents would support continued Service acquisition. We will gauge the extent of public concern during the comment period following release of this draft CCP/EA.

Alternative C

Alternative C would provide the greatest direct contribution to the local economies, compared to the other alternatives, when considering the gain from refuge revenue sharing payments and visitor services, and more indirectly, with savings from the cost of community services.

Including the acres proposed in Alternative A, 11,550 acres of refuge land acquisition would provide an estimated \$1.07 million in refuge revenue sharing payments to affected towns in southern Rhode Island, and \$70,500 to the Town of New Shoreham. As with Alternative B, additional South Shore towns would receive refuge revenue sharing payments, since acquisition would occur throughout southern Rhode Island.

Alternative C proposes to acquire 150 acres total on Block Island, 50 acres more than Alternative B. Other impacts noted above for Alternative B would be the same.

Many residents of Rhode Island wish to maintain its rural character by slowing residential and commercial development. They would realize the most positive impacts under Alternative C, since the acreage proposed for acquisition far exceeds Alternatives A, B and D (see **Table 3-1**, Chapter 3). We have not attempted to quantify this aesthetic, indirect benefit.

Alternative C would not provide the increase in visitor services proposed for Alternatives B and D, and is more closely related to Alternative A in this regard. A slight increase in environmental education and interpretation would occur associated with barrier beach protection, migratory bird management, and piping plover protection and management. We expect a 15-percent increase in visitation, partially attributable to the new Refuge Complex Visitor Center. An estimated additional 52,500 visitors spending \$20/day would invest approximately \$1.05 million in local economies each year.

Alternative D

Alternative D ranks third highest among the alternatives when comparing socio-economic benefits to affected communities. Its land acquisition program is the same as Alternative A, so revenues provided to towns from refuge revenue sharing payments and savings in the cost of community services would be similar. However, in comparison to the other alternatives, Alternative D proposes the most expansive visitor services program for the Refuge Complex.

Included in this expansion is the provision for new deer hunting programs on Block Island, Ninigret, Chafee, and Trustom Pond Refuges and a pheasant hunt on Block Island Refuge. We would evaluate opportunities for small game hunting as well. According to our publication, "National Survey of Fishing, Hunting, and Wildlife-Associated Recreation" (1996), hunters in Rhode Island averaged \$75 in trip-related expenses for each individual hunting trip. These included food, lodging, and transportation, all of which directly contribute to the local economy. Should Alternative D be selected, a subsequent environmental assessment, compatibility determination, and annual hunt plan would determine the number of hunters to permit on the Refuges.

In addition to the new Refuge Complex Visitors Center, visitors would be attracted to major increases in opportunities for all priority, wildlife-dependent recreational uses on each of the five Refuges. With a predicted 25-percent increase in visitation, 87,500 visitors, spending \$20/day, would invest approximately \$1.75 million in local economies.

Summary

Considering the factors described above, compared to the other alternatives, Alternative C would provide the greatest socio-economic benefit to affected communities in southern Rhode Island, primarily because its larger land protection proposal saves in the cost of community services, increases refuge revenue sharing payments, and provides for a modest increase in visitation. Second highest in benefits would be Alternative B, followed by Alternative D, then Alternative A.

Staffing and Budgets

Alternative A (Current Management)

Alternative A would maintain the existing, approved staff positions over the next 15 years. A total of nine permanent, full-time staff and one student trainee are in place. We expect to hire four seasonal staff in 2000. We do not expect substantial increases in the budget for salaries. The seasonal positions are covered through Refuge Operating Needs System (RONS) project funding discussed below. We assume other fixed costs will not change significantly until the new Visitor Center/Headquarters has been completed in 2003.

RONS project funding for our entire Region (Region 5) has been approximately \$1 million annually for the last 2 years. Thirteen projects for the Rhode Island Refuge Complex, totaling \$7.01 million, are now in the RONS database for funding consideration by the Regional Office (Appendix F). In FY2000, only the top priority RONS project for the Refuge Complex was funded.

Discretionary funding for general operations has decreased significantly in the last 2 years and will likely remain minimal. Maintenance dollars will continue to fluctuate as priority projects are funded and new structural work is completed. Appendix F also presents the current backlog of maintenance projects listed for the Rhode Island Refuge Complex in the Maintenance Management System (MMS) database.

Alternative B (The Proposed Action)

Compared to Alternative A, Alternative B would result in sizeable increases over the next 15 years in new permanent and seasonal staff, and a doubling of RONS projects submitted for funding consideration. A total of 26 permanent, full-time staff and 17 seasonal staff would be in place. The budget would increase by \$569,000/year to cover the salary of the new permanent positions. We would continue to fund the seasonal positions through RONS project requests. Other fixed costs would remain at current levels in the short term. The design of the new Headquarters facility would support the proposed increase in staff. In addition to the 13 projects now in the RONS database, we would submit 15 new projects to RONS, for a total request of \$10.3 million (Appendix F). Adequate staffing and funding support for projects over the next 15 years would be crucial to achieving full implementation of this alternative.

Alternative C

Similar to Alternative B, Alternative C recommends significant increases in permanent and seasonal staff over the next 15 years. Alternative C proposes 27 permanent, full-time staff and 15 seasonal staff. The budget would increase by \$617,000/year to cover the salary of the permanent positions. Other fixed costs would be comparable to Alternative B.

RONs project proposals would increase over Alternative A to support habitat restoration and species work, but would not match Alternative B's increases in visitor services projects. Alternative C would not request all of the projects now in RONS. As depicted in Appendix F, we would submit a total of 24 projects totaling \$8.97 million to RONS. As under Alternative B, adequate staffing and funding support for projects over the next 15 years would be crucial to achieving full implementation of this alternative.

Alternative D

Alternative D also proposes a significant increase in staffing over the next 15 years. A total of 24 permanent, full time staff and 11 seasonal staff would be in place. The budget would increase by \$509,000/year to cover the salary of the new permanent positions. Other fixed costs would be comparable to Alternatives B and C.

Proposed RONS project costs would exceed Alternative A and C, but would be less than Alternative B. We would submit 22 projects totaling \$9.21 million to RONS. As with Alternatives B and C, adequate staffing and funding support for projects would be critical to achieving full implementation of this alternative.

Summary

Alternatives B, C, and D are comparable, in that their proposed staffing and RONS projects would support full implementation of each alternative. Alternative C would have the highest staffing cost, followed by Alternatives B, then D, then A. RONS project costs would be highest for Alternative B, followed by Alternatives D, then C, then A. All alternatives include the \$3.8 million in the MMS data base. However, Alternative B would best meet the intent of Goal 5 by increasing the quality and depth of all Refuge programs through increased staffing and projects.

Contaminant Sites

Alternative A (Current Management)

Alternative A proposes to continue coordination with the Environmental Protection Agency (EPA), the agency with primary jurisdiction on CERCLIS site clean-up on Ninigret, Sachuest Point, and Trustom Pond Refuges. No actions are proposed to clean up the extensive military debris on Ninigret Refuge. With little to no change over the short term, impacts should be neutral.

Alternative B (The Proposed Action)

In addition to continued coordination with the EPA, or delegated authority, these alternatives would seek Service and outside funding to clean up the military debris at Ninigret Refuge and train Refuge personnel in Level 1 environmental site assessments. Personnel would then be trained to conduct additional surveys and would be able to monitor existing sites. These actions would directly reduce the adverse impact from contaminants and debris on Ninigret Refuge and would indirectly benefit the other Refuges through staff training.

Alternative C

Same as Alternative B.

Alternative D

Same as Alternative B.

Summary

Alternatives B, C, and D equally reduce impacts from contaminants and military debris, particularly on Ninigret Refuge. Alternative A maintains the status quo; it would not improve the current situation.

Part 2: Individual Refuge Consequences

Block Island

Physical Resources—Soils, Hydrology, or Wetlands

None of the alternatives propose to alter soils, hydrology, or wetlands on existing Refuge lands. We predict no direct, indirect, or cumulative impacts on these resources. All alternatives would comply with the Clean Water Act.

Biological Resources—Vegetation

Alternative A (Current Management)

The only active management of vegetation on Block Island Refuge is the occasional lawn mowing/shrub cutting associated with routine maintenance of the Beane Point facility. The lawn is approximately 1/4 acre in size and has been maintained since the 1940's when the Beane Point house was first built. Overall, the impacts on other vegetation from managing this habitat are insignificant. Further, this small patch of grasslands may provide foraging opportunities for the American burying beetle, which prefers the combination of grasslands with a soil type in which it can dig and bury prey. There is one documented occurrence of the American burying beetle's foraging in this area, but no documented breeding.

Refuge staff and the Nature Conservancy have expressed a concern about visitors, pedestrians and recreational off-road vehicles (ORVs) trampling native beach strand and dune vegetation, reducing or destroying the wrack line, and physically damaging the dune structure. There has been no monitoring to determine the extent of damage. Alternative A would not propose any new protection, monitoring, or restoration.

We estimate 200,000 visitors to Block Island Refuge each year. The majority walk half a mile from the Settlers Rock parking lot, across the Refuge, to the North Light lighthouse. We predict long-term negative impacts on vegetation from unrestricted access, including direct damage to or complete loss of native vegetation in some areas. Unfortunately, the lack of monitoring prevents a more accurate prediction of how much damage would occur.

Over the long term, this negative trend could be reversed by concentrating or restricting public access or revegetating the area. Both of these techniques have proved successful in dune vegetation recovery at East Beach-Watch Hill on the South Shore. However, Alternative A would not manage public use restrictions or initiate a revegetation project. We foresee no other direct or indirect impacts on vegetation from Alternative A.

Alternative B (The Proposed Action)

Similar to Alternative A, Alternative B would maintain the lawn at the Beane Point facility with minimal impacts on other vegetation and, perhaps, provide some benefits to the Federal-listed American burying beetle.

Protection of native beach strand and dune vegetation would be a priority under Alternative B. It proposes designating public access routes to avoid sensitive areas and minimize the trampling of vegetation. No ORVs would be allowed on Refuge beaches and dunes, above the mean high tide line, from April 1 to September 15 each year. Suitable piping plover nesting habitat would also be symbolically fenced each year by April 1. These actions are intended to reduce direct impacts on dune structure and vegetation and the wrack line, and to minimize disturbance to shorebirds, including the threatened piping plover, during nesting and migration. It is entirely possible on Block Island that, with current public use levels on such a narrow beach, there is competition for space between humans and shorebirds. We would impose this restriction during the time of year when vehicle and pedestrian activity is the highest.

Also, Alternative B proposes mapping and monitoring vegetation and the distribution of public use in these areas. We would replant native vegetation if monitoring shows that restoration is needed. This action would directly increase protection and management of native vegetation on the beach strand and dunes, and thus provide a positive impact over the long term.

Approximately 38 percent of the Refuge (35 acres) is vegetated beach strand and dunes. Native dune vegetation is critical to maintaining the integrity of the beach strand ecosystem, as plants trap sand, build and stabilize dunes, and provide cover for wildlife (USDI 1998). We consider beach strand habitats, sand dunes, and their dependent species a priority resource concern (Connecticut River/Long Island Sound Ecoteam 1997). Dunes and dune vegetation are the community types most vulnerable to motor vehicle traffic, followed by salt marshes, the dune/marsh interface, sand flats, backshore, foreshore, and intertidal areas (Godfrey, Leatherman, and Buckley 1978; Leatherman and Godfrey 1979). ORVs on the beach can cause erosion, accelerating movement of sand seaward and by wind transport, and can cause compaction up to 20 cm. below the surface (Anders and Leatherman). Accelerated seaward movement of beach sand likely negatively affects the development of future dunes and increases the vulnerability of the existing dunes to storms. Compaction, which can occur after as few as 10 vehicle passes, has been known to kill subsurface roots of beach grass, resulting in the loss of stabilizing vegetation and erosion of sand, rather than accretion (Anders and Leatherman 1987; Behrens et al. 1976).

ORVs are also known to negatively impact wrack and drift lines, which are also critical to the ecological processes on barrier beaches. Wrack lines are areas on the beach where vegetation and other organic debris are deposited by high tides, especially storm and high lunar tides. The organic debris within the wrackline is important foraging habitat for shorebirds, as it attracts insects and amphipods. According to several studies (Elias et al. 2000; Goldin 1993; Hoopes 1993), the wrackline is the preferred foraging habitat for piping plover chicks. These authors noted that chicks avoided that preferred habitat when ORVs were present, and that destruction of the wrackline by ORVs forced chicks to use less productive foraging areas, including areas even more susceptible to human disturbance, such as intertidal areas.

Also, the wrackline includes live plant fragments that are important to the establishment of dune plants. Ten motor vehicle passes can heavily impact the wrackline by breaking up the organic debris and killing regenerating plants (Zaremba et al. 1979; Zaremba et al. 1980).

We predict some public concern would occur with designating access routes for ORVs and pedestrians and limiting the season for vehicle use to late fall and winter. Few restrictions have been placed on visitors in the past, and because the area is so popular and accessible, any restrictions would be unpopular. The level of opposition is not known, and would be determined during the comment period following release of this draft CCP/EA.

Other actions proposed in Alternative B to directly protect or restore native vegetation include monitoring the loss of Japanese black pine on Beane Point and evaluating ways to maintain the pine's vegetative structure. These pines have supported heron and egret nests for many years; in fact, black-crowned night-herons have been documented since 1976 (Ferren, et al. 1998). Any new plantings would be native vegetation to help ensure sustainability of the habitat.

We would also evaluate opportunities to expand the habitat for the American burying beetle in cooperation with our New England Field Office, RI DEM, and the ad hoc Recovery Team. The northern end of Block Island, within the Focus Area, has fewer acres of suitable habitat for the American burying beetle, compared with the southern end of the island. Despite that fact, other physical characteristics make habitat within the Focus Area potentially suitable for this beetle (Amaral, pers com. 2000). Whenever we acquire new land on Block Island, we would evaluate it for American burying beetle habitat suitability. We would restore, create, or maintain grasslands and other early successional habitat on newly acquired lands if they have potential to expand the current burying beetle population.

Habitat suitability would be based on an assessment of the prey base, whether a suitable soil type is present allowing beetles to bury prey, and the ability to sustain the area in early successional habitat, namely, grasslands. Alternative B presumes we would convert up to 50 acres of mid-seral shrub habitat to early successional grasslands or shrub lands if the soil types and prey base are adequate to support breeding burying beetles. Treatments could include use of a brush hog, hydroaxe, mower, herbicides, or prescribed fire to establish and maintain early successional habitat required by the burying beetle. We would schedule these activities outside the breeding and migrating season for landbirds of management concern and outside the breeding season for burying beetle to minimize impacts on other wildlife.

One concern with creating early successional shrub and grassland habitats is the potential impact on nesting birds and birds migrating through the island that require the use of mature shrub habitat. Management for early successional habitats would directly affect some species. For example, blue-winged and golden-winged warbler, field sparrow, and woodcock are species of concern that use mature shrubs for nesting and foraging on Block Island. Many more species use the berries produced by mature shrubs during fall migrations.

According to Parrish (1999) and Comings (2000), approximately 70 species of landbirds migrate through northern Block Island in the fall and forage voraciously on berries produced by northern arrowwood, northern bayberry, and pokeberry. However, Parrish (1999) noted the availability of fruits was “superabundant” on Block Island based on three observations: (1) in 3 years of survey, birds never removed entire fruit crops and large volumes of fruit dropped and rotted or desiccated on the shrub; (2) there was little to no inter- or intraspecific aggression observed; and (3) no more than 40 percent of any one shrub was depleted of berries. We do not predict a significant impact on foraging habitat from managing 50 acres of early successional habitat.

Further, the positive impacts of creating and maintaining up to 50 acres of a regionally declining habitat type for an endangered species and supporting other grassland dependent species of concern, outweigh the negative impacts of losing mature shrub habitat; notwithstanding the importance of shrub habitat to many landbirds during migration and breeding. Our determination is based on the knowledge that shrub habitat would remain a dominant habitat type on Block Island. Considered in context, 50 acres is a relatively small area compared to the remaining shrub habitat across the island.

Positive impacts would be realized by grassland bird species such as bobolink, savannah sparrow, and eastern meadowlark. These are species of concern that would benefit from 10- to 50-acre grassland habitats (Vickery 1997). Also, in the fall, these grasslands would provide foraging habitat for many migrating birds feeding on insects or seeds. Birds of prey such as kestrels, northern harriers, and short eared owls are species of concern which would directly benefit from the open foraging habitat, which supports small mammal populations throughout the year.

Overall, the biggest positive impact on vegetation from Alternative B would be realized through the 100 acres proposed for Service acquisition. Large-lot (> 3 acres) residential development has increased dramatically in the last decade on Block Island, with build-out expected within 12 years. We would maintain land we acquire in native habitats that would protect important components of the unique biological diversity of the island, and would also promote a natural setting.

Alternative C

Alternative C implements the same actions as Alternative B with respect to vegetation on Block Island with two exceptions: (1) Alternative C would implement a year round ORV closure on Refuge beaches, above the mean high tide line, to avoid the ORV impacts noted in Alternative B above. That action would provide both direct and indirect benefits and increased protection over the long term to native dunes and beach vegetation and shorebird foraging habitat; and (2) the additional 150 acres of land acquisition on Block Island would further maintain native habitats, protect important components of the unique biological diversity of the island, and promote a natural setting. Otherwise, impacts would be similar to those described in Alternative B.

Alternative D

Alternative D would designate pedestrian and ORV access trails to reduce direct trampling to dune structure and vegetation, but would not otherwise manage public use. Closures for piping plover would be implemented as described for Alternative A. Also, Alternative D does not propose extensive monitoring of native dune vegetation or the black pine stand. As a result, the long-term sustainability of both native dunes and beach vegetation and the black pine stand would be at greater risk.

Summary

Alternative C slightly exceeds Alternative B in providing the best long-term protection to the ecological integrity and biological diversity within the Block Island Focus Area through management and new land acquisition. These alternatives best meet the intent of Goals 1 and 2 on Block Island Refuge. Alternatives A and D are comparable to each other, but do not offer the same level of long-term protection as Alternatives B and C.

Biological Resources—Threatened and Endangered Species and Other Species of Management Concern

Alternative A (Current Management)

Federal-listed species known to breed on Block Island are the endangered American burying beetle and the threatened piping plover. Federal-listed threatened bald eagles have consistently been observed roosting and foraging during the summer months, without nesting. Alternative A does not propose any management for the American burying beetle, although maintaining the lawn at the Beane Point facility may provide minor benefits to foraging beetles.

Alternative A would continue to monitor suitable piping plover habitat on the Refuge at least 3 times/week beginning by April 1. Symbolic fencing will be placed by April 1 around suitable habitat on the Refuge to exclude pedestrian and ORV traffic in that immediate area. Pedestrian and ORV access would still occur around the fenced area to reach Sandy Point tip. Once a nest has been located, we would erect a predator nest enclosure. Refuge beaches would be closed to vehicles just prior to chicks hatching. If the nest is on town beach, we would work with the Town of New Shoreham to protect the nest site and manage public use.

There have been only two known piping plover nesting attempts within the Focus Area over the last 15 years. Opinions by piping plover experts as to why these numbers are so low include: (1) the threat of gull predation from the established gull colony; (2) excessive disturbance from human activities; (3) the beach profile has become narrower over the last decade; and (4) the remoteness of a source population to draw birds from (Raithel 1999; Taylor 1999, pers com). Alternative A addresses none of these potential concerns. Despite these concerns, we continue to regard Block Island Refuge as having potential nesting habitat for piping plover. It should also be noted that this nesting season (2000), a piping plover pair successfully fledged two young on a town-owned beach south of the Focus Area. According to The Nature Conservancy on Block Island, this is a quiet section of beach, more difficult to access, with much less human disturbance than the other beaches with historic plover use (Comings, pers com 2000).

With the exception of piping plover management described above, we would not direct any additional actions specifically at benefitting resident or migratory birds. Limited information on landbird use at Block Island Refuge would continue. Only the gull colony on West Beach and the heron/egret rookery on Beane Point would continue to be monitored by RI DEM and The Nature Conservancy. Since no habitat manipulations would occur under this alternative, we predict neutral impacts on breeding birds.

This alternative does not propose any actions directed toward management for reptiles or amphibians. We know very little about their population levels and habitat use within the Refuge. However, most of the species known on Block Island are associated with water, which would not be affected under Alternative A. We predict no direct or indirect impacts on amphibians and reptiles.

This alternative does not propose any actions directed toward habitat management for mammals. We know very little about their population levels and habitat use within the Refuge. However, we suspect most of the mammals known on the island also occur on the Refuge. The Nature Conservancy describes most of them as ubiquitous on the island. The majority are upland species, with the exception of muskrat. Deer are prevalent on the island, but their population on the Refuge is not known. With no habitat management proposed, we predict negligible to no impact overall on mammals under Alternative A.

Overall, Alternative A does not directly or indirectly impact the American burying beetle or piping plover in a negative way; we predict no positive gains or improving conditions over the short or long term. We also predict no impacts on amphibians, reptiles, and mammals. Overall, the impacts are neutral, and maintain the status quo.

Alternative B (The Proposed Action)

Alternative B would implement several actions designed to directly improve habitat conditions for the American burying beetle, provided the habitat is suitable upon detailed evaluation, and increase protection for the piping plover. Further, Alternative B would increase our understanding of the threats and limitations for these species on Block Island. In addition, this alternative proposes to monitor the seasonal activities of bald eagles in the Focus Area.

One important objective of this alternative is to work with our New England Field Office, RI DEM, and the ad hoc Recovery Team to try to expand the American burying beetle breeding population into the Focus Area. As discussed under “Vegetation” above, Alternative B proposes to evaluate all current and new land acquisition for potential American burying beetle habitat. We may convert up to 50 acres of shrub habitat to grasslands if suitable lands become available. Conversion of shrub habitat to grasslands supporting burying beetle has proven successful on shrub dominated fields on southern Block Island, so there is precedence (Amaral, pers com. 2000). Alternative B proposes that Refuge staff become actively involved in ongoing burying beetle monitoring on the southern part of the island and significantly increase inventories in the Focus Area. These actions would directly benefit burying beetle over both the short and long terms.

Alternative B proposes to increase protection and management for piping plover by hiring staff to survey for piping plover earlier in the season, to monitor public use in nesting areas, to monitor public use in potential nesting areas, and to monitor the interaction with the established gull colony. Each of these actions would help Refuge staff understand factors limiting piping plover production.

Alternative B also proposes to work with the Town of New Shoreham to explore the possibility of installing symbolic fencing on a portion of Sandy Point beach on an experimental basis before and during the piping plover nesting season (April 1 to September 15) in order to enhance the closure on Refuge beach. Visitors and their dogs would be restricted from the area enclosed by symbolic fence. This would help determine if human disturbance is limiting use of the area by piping plover.

In addition, Alternative B proposes a restriction on ORV use on Refuge beaches, above the mean high tide line, from April 1 to September 15 each year, in part to protect nesting and migrating shorebirds, and to work toward reestablishing an active piping plover nest area. According to the Revised Recovery Plan for the Atlantic Coast Piping Plover, “Unrestricted use of motorized vehicles on beaches is a serious threat to piping plover and their habitats.” Piping plover have not nested successfully in the Focus Area since 1978.

During migration, the principle activities for shorebirds are feeding and resting. Frequent disturbance causes shorebirds to abandon or reduce use of an area and reduces the amount of time resting and foraging, thus impacting energy reserves needed for migrating. Roosting semipalmated sandpipers and feeding sanderlings flush more frequently in response to ORVs than to pedestrians on sandy beaches (Harrington et al. 1996).

While it could be argued that pedestrian traffic is at least as disturbing to foraging or resting shorebirds throughout the year, the risk of inadvertent nest destruction and direct impacts on chicks is higher from ORVs for a variety of reasons. In fact, direct mortality from vehicles has been documented on several New England beaches (Hecht, pers com. 2000). The birds' cryptic coloring and the exposed nature of piping plover and other shorebird nests often precludes a driver from seeing and avoiding them. Further, multiple studies have found that piping plover chicks "freeze" when a vehicle approaches, instead of running off as they do when disturbed by pedestrians (Goldin et al. 1989; Melvin et al. 1994). Chicks also tend to travel down tire ruts, and have difficulty crossing or getting out of deep ruts and out of the way of an oncoming vehicle.

In summary, there are several instances in New England where restrictions on public use and vehicles have resulted in increased piping plover nesting (Hecht, pers com. 2000). We can not predict this with certainty on Block Island where we are proposing symbolic fencing and seasonally closing the entire Refuge beach above mean high tide to ORV use. However, these actions certainly increase the likelihood of occupancy and successful fledging over what current management offers. These actions are both recommended in the Revised Recovery Plan. The Recovery Plan promotes "very intensive" management actions for piping plover on national wildlife refuges, especially when their purpose for establishment is protection of threatened and endangered species, as is the case for Block Island Refuge.

We predict public opposition to these changes in public beach use and access. Our experience with piping plover management on Block Island shows that residents and visitors accept the restrictions on public use if the birds are present and visible. We expect fewer residents to embrace pre-emptive restrictions on an experimental basis. We do not know the level of opposition, which we would determine during the comment period following release of this draft CCP/EA.

Alternative B proposes hiring additional staff, in part to conduct the increased monitoring of species and habitats on each of the Refuges and to increase Service presence on Block Island. Besides the work on burying beetle and piping plover, staff would also monitor the seasonal bald eagle roost sites in the Focus Area, and identify potential threats and land acquisition opportunities for the sites. Alternative B also proposes to develop site management plans by 2005, if necessary. These actions would positively impact bald eagles, over both the short and long terms, by increasing the biological information from which Refuge Staff can make informed decisions to protect this species.

In addition, Refuge staff would monitor the heron/egret rookery to identify threats and determine if it is possible to maintain the rookery or sustain the population in other parts of the Focus Area over the long term. These actions would directly benefit wading birds on the island.

Refuge staff would also develop habitat, monitoring, and inventory plans for landbirds and shorebirds of concern throughout the Refuge Complex. Measures identified above for piping plover would directly benefit species of concern on Block Island, like black oystercatcher, least tern, common tern, and black skimmer. The proposed plans would indirectly benefit landbird and shorebird focus species by increasing baseline information. Direct benefits would occur over the long term when specific actions are implemented.

As described above for the American burying beetle, we could convert up to 50 acres of shrub land to grassland and early successional shrub habitat to provide breeding sites. To avoid direct impacts, habitat work would occur outside the breeding seasons for songbirds and the beetle. The negative impacts on shrub nesting species were noted above in the Alternative B discussion on vegetation.

Alternative B would develop an inventory and monitoring plan for amphibians and reptiles on the Refuge Complex. This action would indirectly benefit these species by increasing the biological information available to Refuge Staff for management decisions. With little information on how amphibians and reptiles are using the Refuge, it is difficult to determine for certain how they would be impacted during potential habitat manipulations proposed for the American burying beetle. We predict short-term displacement of some species that use upland habitats, such as garter and northern brown snakes, during the habitat work. However, over the long term, these species would move to adjacent suitable habitat or would use created grassland areas. We expect, at most, to lose only a few individuals of each species. The garter and northern brown snake are common reptile species in Rhode Island, and their local populations would not be at risk of extirpation.

Alternative B provides the greatest potential benefit to reptiles and amphibians, through Service acquisition of as many as 100 acres in the Focus Area otherwise at risk for development. Habitats existing on most of these acquired lands would not be changed through management, so the habitat quality for these species would be maintained. Reptiles and amphibians would directly benefit from this land protection. Further, Alternative B would not directly manipulate wetlands, nor do we predict indirect impacts on wetlands from other management activities.

Alternative B proposes to work with RI DEM, the Town of New Shoreham, and adjacent landowners to develop a deer management plan for the Focus Area. That plan would set habitat, human health and safety objectives, and other management objectives to ensure that deer populations are within the carrying capacity of the habitat. RI DEM, the Town of New Shoreham, and many island residents are concerned about excessive deer populations. Vehicle-deer collisions have increased, as have impacts on residential landscaping. We would acquire 100 acres of deer habitat, which might otherwise be developed as low-density residential housing. We may recommend a deer hunt in the future, but would base its objectives on maintaining deer numbers within an established carrying capacity and reducing threats to human health and safety. Opening the Refuge to deer hunting would require a separate environmental assessment outlining specific actions, a compatibility determination, a public review and comment period, and an annual hunt plan.

Refuge staff would monitor the seal haul out areas near the Refuge, indirectly benefitting them by increasing our biological information on seals. With little information on how other mammal species are using the Refuge, it is difficult to determine for certain how they would be impacted during potential habitat manipulations proposed for the American burying beetle. We predict that some species, such as the meadow vole and the white-footed mouse, would be displaced in the short term during the habitat work. However, over the long term, these species could use created grassland areas or move to adjacent suitable habitat. We expect, at most, to lose only a few individuals of each species; local populations would remain viable.

Overall, Alternative B would result in increased biological information on a variety of species. Most species would directly benefit from Service land acquisition, which prevents habitat fragmentation. Over the long term, we expect the benefits to continue to increase with the implementation of habitat plans.

Alternative C

The impacts identified for threatened, endangered and other species of concern under Alternative B would be slightly more positive under Alternative C. It would initiate a Piping Plover Working Group for Rhode Island, whose increased coordination would indirectly benefit piping plover throughout Rhode Island. How it would benefit piping plover specifically on Block Island is uncertain. The year-round ORV closure on Refuge beaches above mean high tide under Alternative C would enhance habitat quality for beach-dwelling species throughout the year. Further, the additional 50 acres of land acquisition provides the same types of benefits described for Alternative B, only at a slightly greater level.

Alternative D

Same as Alternative A.

Summary

Alternative C slightly exceeds Alternative B in providing the most positive, direct, long-term impacts on threatened and endangered species and other species of concern on Block Island, followed equally by Alternatives A and D. Alternatives B and C would best achieve the intent of Goal 1 on Block Island Refuge. We will begin Section 7 consultation, to ensure compliance with the Endangered Species Act, with release of this draft CCP/EA.

Cultural Resources

Alternative A (Current Management)

No management actions proposed with these alternatives would increase cultural resource information or management on Block Island Refuge. We would survey any future ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act. We predict neutral impact on cultural resources over the short and long terms.

Alternative B (The Proposed Action)

Alternative B proposes to do a cultural resources overview of the Refuge Complex and to train more Refuge staff in Archeological Resource Protection Act enforcement. These actions would increase the information available to Refuge staff and would improve enforcement of known sites listed by the Historic Preservation Office, although we know of none on Block Island Refuge. As with Alternative A, all future ground-disturbing projects would be surveyed in compliance with Section 106 of the National Historic Preservation Act. This alternative would indirectly benefit cultural resources over the long term on Block Island.

Alternative C

Alternative C proposes to conduct cultural resource field surveys on the Refuge in addition to the cultural resource overview, and would provide increased enforcement, and develop an environmental education curriculum associated with cultural resources. By conducting field surveys, establishing additional enforcement, and educating the local community, cultural resources on Block Island would directly benefit over the long term.

Alternative D

Same as Alternative A.

Summary

Alternative C would provide the greatest benefit to the cultural resources program on Block Island through increased field surveys on the Refuge. Alternative B would conduct a records overview but would not involve extensive field surveys. Alternatives A and D would not implement either action. All alternatives would comply with the Archeological Resources Protection Act. We will begin Section 106 review, to ensure compliance with the National Historic Preservation Act, with release of this draft CCP/EA.

Public Use

Alternative A (Current Management)

Five of the six priority public uses occur on Block Island Refuge. These include fishing, wildlife observation and photography, environmental education and interpretation. Non-wildlife-dependent uses, like driving ORVs, dog walking, swimming and sunbathing, jogging, and kite flying, are also occurring on the Refuge.

We do not expect changes in public use activities under Alternative A; priority public use programs would continue to be minimal and the Service presence would be limited. We predict a 10-percent increase in visitor numbers, considering historic increases and the increased visibility of the Refuge through the Refuge Complex Visitors Center.

No visitor service or public use infrastructure is in place on the Refuge. Of the priority public uses occurring on the Refuge, only fishing was formally declared open, in accordance with State regulations, through a Federal Register Notice. Alternative A would continue to allow The Nature Conservancy of Block Island to conduct environmental education on Refuge lands, unassisted by Refuge staff or funding. All of Beane Point would remain closed to public access. Alternative A would also continue to restrict public use, through the use of symbolic fencing, on Refuge beaches where suitable piping plover habitat occurs as described above. Additional restrictions on ORV use would be imposed if piping plover nest. No other public use management actions would be implemented under Alternative A.

We would continue to evaluate public uses on newly acquired lands on a case-by-case basis. In general, we would allow existing priority public uses to continue if they were found compatible. We would not allow new uses until we had completed a formal compatibility determination. Since most of the land to be acquired is now in private ownership, we predict negligible impacts on current public uses overall.

ORV use on Block Island Refuge creates the most user conflicts and management issues of any non-wildlife-dependent use. It is an even larger management issue when it is not conducted in support of surf fishing. ORVs are using the beach from the town parking lot at Settlers Rock, around Sandy Point, and down West Beach to the junction with West Beach Road. These areas combine to create a continuous 2.25 mile stretch of beach. The two entry points for vehicles are Settlers Rock and West Beach Road. Of that 2.25 mile stretch of beach, approximately one-half mile total, in non-continuous sections, lies on Refuge lands. Refuge staff have observed a dramatic increase in the number of ORVs visiting Block Island over the past 5 years. Since the Sandy Point/West Beach Area is the only beach open to daytime driving on Block Island, we predict the level of ORV use would slightly increase over the next few years, commensurate with the 10-percent increase in visitation we are predicting and because of the continued popularity of sport utility vehicles. The demand for this form of recreation remains strong, and other opportunities for beach driving are very limited throughout Rhode Island. Any increase in ORV traffic on this limited stretch of beach would escalate conflicts between pedestrians and ORVs at Sandy Point and West Beach.

Staff shortages have limited our ability to address that activity and other non-wildlife-dependent public uses at Block Island Refuge. Alternative A would not increase staffing or operating funds. Inconsistent enforcement of inappropriate, incompatible activities would continue. That lack of monitoring and enforcement would benefit non-wildlife-dependent users at the expense of a quality experience for visitors engaged in priority public uses. Further, as noted above under the biological discussions, we predict an increased adverse ecological impact on wildlife and habitat values over the long term as a result of public use activities, especially ORV use.

Alternative B (The Proposed Action)

Alternative B proposes to increase public use opportunities on Block Island Refuge in several ways. It would develop a Refuge Complex Visitor Services Plan to address program needs, opportunities, visitor capacities and thresholds of change, identify target audiences, and determine how to evaluate success. It also proposes to establish formal partnerships to address visitor service planning and funding.

All inappropriate and incompatible, non-wildlife-dependent public use activities would be phased out on Refuge lands by 2005. Activities like dog walking, jogging, swimming and sunbathing, and kite flying do not support a priority public use, nor are they required to meet the goals of the Refuge, nor do they contribute to the purpose for which the Refuge was established. ORV use at Block Island Refuge is another example, except where it is used in surf fishing outside of the proposed shorebird seasonal closure period. This activity is discussed separately below. Further, these activities diminish the quality of experience for visitors engaged in a priority public use, and in the case of dog walking, can adversely impact habitat conditions for many species of wildlife. None of these activities are compatible with the Refuge purpose, and would be eliminated.

At this time, no public hunting is proposed. After completion of a cooperative deer management plan for the Focus Area by 2002, we may recommend a public hunt. We would base the objectives for a deer hunt on the need to maintain deer populations within an established carrying capacity and to reduce threats to human health and safety. However, a separate environmental assessment, a compatibility determination, and an annual hunt plan would be required before a new hunting opportunity is implemented.

While Alternative B does not propose any changes to the area open to fishing on Block Island Refuge, it would impact surf fishing by closing the Refuge beach (approximately half a mile) above the mean high tide line to ORVs from April 1 to September 15. By 2002, we would implement that restriction to protect nesting and migrating birds and reduce impacts on the dunes. We noted the biological issues and impacts regarding ORV use above, under the biological discussion for each Alternative. This action would negatively impact all visitors who drive on the beach, including those who use ORVs for surf fishing access. However, Alternative B would mitigate that impact on Refuge visitors by establishing a parking area next to the North Light. From the proposed parking area, visitors could access all of the beach around Sandy Point without having to walk more than one-quarter of a mile.

In addition, by 2004, we would cooperate with the Town of New Shoreham to develop a resource protection and public use and access plan to reduce wildlife and habitat impacts while assuring appropriate public use of the northern tip of the island. One objective of that comprehensive, cooperative approach would be to ensure long-term protection of resources and public support for proposed management action.

Past experiences with restricting public access on Block Island Refuge for piping plover management has shown public opposition to restricting access. We will not know the full extent of opposition until after the comment period for this draft CCP/EA.

Alternative B proposes expanding the environmental education program currently implemented by The Nature Conservancy. This proposal would provide Service resources and staff to cooperatively develop and implement an environmental education program with The Nature Conservancy for Block Island. Alternative B would utilize the Beane Point facility to support environmental education efforts. This would result in a positive impact on the environmental education program on Block Island.

Alternative B would also develop and fund an interpretive plan for the Block Island Focus Area. This would greatly expand the opportunities for environmental interpretation on Block Island, which are now non-existent. Environmental interpretation would target Island residents and visitors with a goal of promoting increased environmental stewardship. Alternative B would result in a positive impact on Refuge visitors who enjoy environmental interpretation.

On newly acquired lands, we would allow priority, wildlife-dependent public use to continue on an interim basis unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before acquisition.

Overall, Alternative B would result in a positive impact on wildlife-dependent public use over the long term by increasing opportunities and improving the quality of visitor experience by eliminating conflicts with non-wildlife-dependent public uses.

Alternative C

Alternative C would reduce the overall level of public use on Block Island Refuge in order to focus limited resources on improving the wildlife and habitat values on Refuge lands. Opportunities for environmental education, only, would increase from current levels, with the primary objective of promoting better stewardship of wildlife and habitat. Alternative C would also:

- close Refuge beaches year round to ORVs above the mean high tide line;
- designate pedestrian access and trails; and
- eliminate use of Beane Point, except for environmental education programs.

Similar to Alternative B, no hunting is proposed at this time, and would be considered only after completion of the cooperative deer plan. A separate environmental assessment, compatibility determination, and annual hunt plan would also be required.

Alternative C proposes to close the Refuge shoreline above the mean high tide line, including Beane Point, to all fishing during the piping plover and waterbird nesting season and during shorebird migration season (April 1 to September 15 each year) to reduce human disturbance to shorebirds. We would allow fishing during the rest of the year. Since most of the fishing from the Refuge shoreline occurs during the proposed closure months, this alternative would result in a sizeable reduction in fishing opportunities, and a negative impact on visitors who engage in saltwater fishing. This action would be the biggest concern for public use under Alternative C. We will not know the full extent of opposition until after the comment period for this draft CCP/EA.

Alternative C would also restrict wildlife observation and photography to designated trails in order to protect fragile dune habitat. Restricting access would limit areas of the Refuge open to public use and negatively impact those visitors used to traversing the Refuge.

Beane Point would remain closed to all public use except environmental education (outside of the seasonal closure for shorebirds and wading birds, March 1 to September 15) by foot access only. Since Beane Point is not open to public access, this action provides a new opportunity at Beane Point and would benefit visitors engaged in these wildlife-dependent activities.

Alternative C proposes the most aggressive schedule for eliminating all inappropriate and non-wildlife-dependent use at Block Island Refuge. By 2002, all non-wildlife-dependent activities would be eliminated. Increased staffing, including law enforcement, would ensure compliance with the changes in public use. Our visibility and interactions with visitors would markedly increase.

On newly acquired lands, we would allow existing priority wildlife-dependent public uses to continue on an interim basis unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Overall, Alternative C would affect current public uses more than the other alternatives, restricting many activities to minimize human disturbance to wildlife and habitats. We predict this proposal would result in some public opposition, the extent of which will be determined upon release of this draft CCP/EA.

Alternative D

Alternative D proposes to substantially increase resources directed towards improving priority public use on Block Island Refuge, while working within our legal framework and compatibility mandates. It would implement a public deer and pheasant hunt, administered by RI DEM, under regulations to be established by the Refuge (Refuge Regulations 50 CFR 32). The hunting public would positively benefit from this new opportunity, as hunting elsewhere on Block Island is limited and confined to small tracts. In fact, hunting opportunities throughout Rhode Island continue to diminish as land is developed and habitat is lost. As natural habitats diminish through development, deer will increase their use of Refuge land, and providing opportunities to control deer populations consistent with habitat capability will become more important. Opening the Refuge to hunting would help keep deer within the carrying capacity of the habitat, ensuring deer do not over-browse native vegetation or impact residential landscaping. Further, reducing the deer herd would help reduce vehicle-deer collisions. Archery only areas would reduce the perceived threat by the general public that hunting is a risk to human health and safety. We would coordinate the Refuge hunt with adjacent lands that are open to hunting.

Not only does hunting support one of the priority public uses identified in the Refuge System Improvement Act, but an established, annual hunting program would provide a direct benefit to the local economy. As described in our publication, "National Survey of Fishing, Hunting, and Wildlife-Associated Recreation" (1996), hunters in Rhode Island invest an average of \$75/trip directly into the local economy for food, lodging, transportation, licenses and equipment. That figure may be slightly higher on Block Island, due to the need for ferry service.

We heard both support and opposition to hunting during public scoping for this draft CCP/EA. Service policy requires a separate environmental assessment, public comment period, compatibility determination, and annual hunt plan to address those concerns before implementing a new hunt program. An environmental assessment would outline the details of the hunt program, evaluate negative impacts on other non-target wildlife and their habitats, and consider impacts on visitors engaged in other priority, wildlife-dependent uses.

Fishing opportunities on Block Island would not change from the existing ones. We would allow year-round surf fishing from the shoreline, although we would designate an access route across the dunes.

Similar to Alternative B, Alternative D proposes to eliminate current, non-wildlife-dependent uses by 2005. Impacts would be similar, resulting in reduced use of the Refuge by many people engaged in these activities. However, the quality of experience for priority wildlife-dependent users would increase as a result.

On newly acquired lands, we would allow existing, priority, wildlife-dependent public uses to continue on an interim basis unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Overall, Alternative D would result in the greatest expansion of priority, wildlife-dependent public use programs. It would dedicate a dramatic increase in funding and staffing to that expansion. However, this alternative would result in the greatest potential risk of disturbance to wildlife and habitats from public use activities. Successful implementation would require intensive monitoring of activities. An important aspect of this alternative is the development of the Refuge Complex Visitor Services Plan. Among other things, it would establish thresholds or limits on visitor impacts on wildlife and habitats. This would ensure that public use activities would remain compatible with the Refuge's purpose.

Summary

Alternative B provides the best balance in meeting Goals 1 and 4, increasing priority public use opportunities at minimal risk to wildlife and habitats. Alternative D would provide the greatest positive impact on priority public uses because of the increases in program breadth and depth. However, there would be a greater potential risk from disturbance to wildlife and habitats. The extent of this risk is not known, but monitoring and evaluation would be an important part of implementation. Alternative B would result in a moderate increase in opportunities to priority public use, but would continue to implement wildlife and habitat projects as a higher priority. Alternative C would provide the fewest benefits to public use, focusing almost exclusively on wildlife and habitat projects. Alternative A would continue current public use opportunities at risk to long-term wildlife and habitat quality.

Ninigret Refuge

Physical Resources – Soils, Hydrology, and Wetlands

Alternative A (Current Management)

Machine-piled dirt and boulders, buildings, and human-made ponds are evidence of the tremendous amount of earth-moving that occurred on Ninigret Refuge with construction of the Charlestown Naval Auxiliary Landing Facility in the early 1940's (see Chapter 2–*Affected Environment*). The Navy backfilled between Hunters Island and the mainland to extend one of the runways, and constructed a series of ditches to direct runoff from the runways to Ninigret Pond. Where these ditches dump fresh water into Ninigret Pond, and in the Hunters Island area, the salinity of the water has decreased, as evidenced by the invasion of Phragmites, an invasive plant species not tolerant of brackish water.

These drainage ditches were effective at transporting runoff until recent restoration work removed 25 acres of asphalt runway. Refuge staff have since observed that the ditches carry very little water, receiving runoff only from adjacent Ninigret Park. Another noticeable change of runway removal has been the ponding of water in a few areas where asphalt used to be. Although most precipitation is percolating subsurface, the ponding suggests an artificially compacted silt layer remains in some areas. None of these observations have been monitored or quantified.

Reducing freshwater flow from the drainage ditches into Ninigret Pond would likely result in increased salinity levels in the immediate pond areas. We expect Phragmites to decline as a result. No modifications to the drainage ditches, the man-made ponds, the smaller natural ponds, or the backfilled area connecting Hunters Island are proposed under Alternative A. With the exception of the reduced freshwater flow, no direct or indirect impacts are predicted for Ninigret Pond.

Alternative A proposes to continue the original plan of restoring 60 acres of asphalt runway and 10 acres of adjacent gravel shoulder to native grasslands. In order to protect seedling grassland plants from succumbing to frost heave, the soil would be aerated or otherwise mechanically treated to increase percolation. Seeding is accomplished with a seed drill pulled behind a tractor. Seed beds are fertilized for up to 2 years with potassium and phosphorus, using a truck-mounted fertilizer distributor.

Alternative A proposes to treat an additional 150 acres of woody vegetation or natural grasslands to maintain early successional habitat or to keep shrubs from encroaching on the restored grasslands. Mechanical, chemical, and prescribed fire treatments would be used on this project, potentially affecting soils or wetlands. Mechanical treatments typically include use of a hydroaxe, brushhog, or root rake to manage woody vegetation. This equipment has already been used on the Refuge with no irreparable impacts on soils or wetlands. No heavy equipment would travel on wetlands or hydric soils, and off-runway travel would be kept to a minimum.

The Regional Contaminants Specialist, who is responsible for ensuring we comply with Federal requirements, annually reviews our use of chemical herbicides. We expect only minimal impacts on soils or wetlands from mechanical or chemical treatments over both the short and long terms.



Contaminants. *Contaminants Specialist Tim Prior checks the soil beneath the former Naval runways at Ninigret Refuge. USFWS photo*

Management-ignited prescribed fire would occur under the stipulations required by the Fire Management Plan (1995). While prescriptions do not allow burning under extreme conditions that would “cook” soils to the point where soil productivity is adversely impacted, small hot spots might occur. However, these would likely be small, isolated areas. We predict no negative impact on soils, hydrology, or wetlands over the long term.

Overall, the projects proposed in Alternative A are designed to remove asphalt runways in order to establish a native ground cover and begin to restore a more natural hydrologic flow. Short-term impacts on soils, in the form of compaction and burn spots, may occur during restoration work. However, these impacts would be limited in duration and intensity. Over the long term, Alternative A would improve conditions for soils, hydrology, and wetlands on Ninigret Refuge.

Alternative B (The Proposed Action)

The benefits to soils and hydrology described for Alternatives A and D would also occur under Alternative B. Alternative B, however, proposes additional projects designed to further benefit soils and restore the health and diversity of wetlands.

One project would re-establish a small wetland (approximately 1 acre) that existed before runway construction. An evaluation of exposed soils, after recent runway removal, combined with a review of 1939 aerial photos, revealed that at least five small vernal pools existed before runway construction. The proposed restoration would mechanically remove the layers of silt from approximately one acre (370' x 110') until we reach hydric soils at an estimated depth of 6 feet. We would stockpile and grade removed soils to create sloping mounds on two adjacent sites, then seed the mounds and the wetland's edges with native grasses.

We will evaluate opportunities and develop plans to restore and maintain a more natural hydrologic flow to: (1) the backfilled area now connecting Hunters Island to the mainland; (2) the areas affected by drainage ditches; (3) the Phragmites-dominated wetlands on the Refuge; and (4) the natural ponds. We would also evaluate breaching the backfilled area and filling in all, or sections of, the ditch network. Approximately 70 acres would be impacted.

Alternative B's land protection strategy would benefit water quality in Ninigret Pond by acquiring up to 500 acres from willing sellers within this pond's watershed. Service acquisition would preclude further residential development in the vicinity, help maintain groundwater recharge areas, and partially protect inputs to the salt pond and wetlands. Water quality in Ninigret Pond is poor, with high nitrogen and fecal coliform bacteria levels (CRMC 1998). Older, failing septic systems are suspected to be the leading cause of nitrate and bacterial loading in coastal salt ponds.

During restoration work, large equipment and prescribed fire may impact soils, similar to Alternative A. That risk would be slightly higher with the additional 70 acres of wetlands restoration proposed under Alternative B. Restoration projects close to Ninigret Pond could temporarily increase sedimentation, although none has been documented thus far in the asphalt removal project. We predict that short-term impacts would be limited in scope and intensity and, over the long term, these projects would provide greater positive impacts than Alternatives A or D, thereby substantially benefitting soils, hydrology, and wetlands on the Refuge.

Alternative C

Impacts from implementing Alternative C would be similar to Alternative B. Indirect benefits would increase proportionately, as approximately 3,100 acres of new Refuge in the pond's watershed are established over the long term. Compared to the other alternatives, this level of land protection offers the greatest potential benefits to water quality in the watershed, plus the ability to better protect groundwater sources, wetlands, and tributaries to Ninigret Pond.

Alternative D

Same as Alternative A, except we would not use herbicides and prescribed fire to control invasive plants or maintain early successional habitat. Eliminating these tools reduces threats from habitat work to human health and safety. However, the loss of these tools would greatly hamper our ability to manage vegetation over the long term. Given the aggressive nature of invasive plants and their dominant presence on the Refuge, we would typically use all tools and techniques in combination to establish and maintain successful habitat areas in a cost-effective, timely manner. The success of the habitat projects would be compromised without the use of these tools, as would the our ability to properly manage the proposed acreage.

Summary

Alternative C would provide the greatest long-term beneficial impact on soils, wetlands, and hydrology, and would best meet the intent of Goal 2 on Ninigret Refuge. Alternative B would provide the second-greatest long-term benefit to water resources, followed by Alternatives A and D. All Alternative would comply with the Clean Water Act.

Biological Resources–Vegetation

Alternative A (Current Management)

Alternative A would impact vegetation through actions designed to protect a rare plant site, control invasive plant species, and manage grasslands and shrub lands. Alternative A proposes to relocate a section of Refuge trail to minimize the risk of trampling the rare plant site. This action would directly benefit the rare plant population over both the short and long terms.

We would continue to manage invasive shrub species in conjunction with the grasslands project, and we would continue sporadic treatments over a limited area to reduce Phragmites on the Refuge. Mechanical, chemical, biological, and prescribed fire would all be used to control invasive plants. Control of invasive species supports a priority goal of the Connecticut River/Long Island Sound Ecosystem Team.



Rare plants. *Ninigret Refuge has the greatest concentration of yellow-fringed orchid in Rhode Island. USFWS photo*

Alternative A would create or maintain a total of 220 acres of early successional coastal sandplain habitat, including grasslands. Approximately 70 acres of early successional habitat would be created from asphalt and gravel as described above. An additional 150 acres of predominantly shrubs and pole-sized trees, with some grasslands intermixed, would be treated over time to create and maintain early successional habitat, to minimize encroachment of woody vegetation into established grasslands, or to protect sensitive plant communities. Creating and maintaining sandplain grassland areas is a priority goal of our Connecticut River/Long Island Sound Ecosystem Team. No other actions are designed to manage the shrub and forest habitat types.

Approximately 20 percent of the shrubs impacted consist of non-native species such as Asian bittersweet, honeysuckle and autumn olive. The native shrub species include northern arrowwood, sumac, bayberry, and highbush blueberry. Affected trees would include eastern red cedar, larch, black cherry, or red maple, with maximum diameters of 6 to 8 inches.

Shrub nesting bird species of concern, such as blue-winged warbler, golden-winged warbler, yellow breasted chat, field sparrow, and American woodcock would be directly impacted by the loss of habitat. We would also negatively impact many berry foraging bird and mammal species and edge-associated species using shrubs for resting, cover, or perching. None of these edge or shrub-using wildlife species are Federal-listed as threatened or endangered. Because of their mobility and the extensive shrub habitat available in adjacent areas, we predict these wildlife species would relocate as treatments progress. We would not expect to eliminate any wildlife species, or even reduce local populations to the point where their viability is threatened by the treatments.

While we predict the frequency or percentage cover of shrubs and trees would decrease over the long term, the objective is not to eliminate shrub species entirely in the treatment areas. Rather, most shrubs would be set back to lower growing, younger, non-berry-producing plants in order to maintain an early successional structural stage.

Negative impacts on shrub-associated wildlife species would be a long-term loss, but grassland-associated species would directly benefit from the treatments. Grasslands have been drastically declining in New England, both in quantity and quality, over the last 100 years (Vickery 1997). According to Vickery et al., in the past 60 years the amount of hectares of hayfield and pasture in New England and New York has declined by 60 percent. The remaining grasslands are smaller and more isolated and may not support grassland birds or viable populations of other grassland species with limited dispersal capabilities (Vickery and Dunwiddie 1997).

Vickery (1997) suggests that grassland patches larger than 100 acres provide the greatest opportunity to support a wide array of breeding grassland bird species, including species of concern such as the upland sandpiper and grasshopper sparrow. Smaller patches, up to 10 acres, would provide breeding and foraging habitat for species of concern such as bobolinks, eastern meadowlarks, and savannah sparrows. Migrating sparrows, horned lark, and warblers could also use these smaller fields. Alternative A would create 220 acres of early successional habitat, predominantly grasslands, in a fairly contiguous patch, allowing for the greatest complement of grassland species.

Alternative B (The Proposed Action)

Alternative B would implement the same grassland restoration projects proposed in Alternative A, but because these projects would be elevated in priority, they would be accomplished sooner than proposed for Alternative A. In addition, this alternative would develop a maintenance and monitoring strategy to ensure success of projects. Further, Alternative B proposes to increase the control of invasive plant species and evaluate the possible reintroduction of several rare grassland plant species extirpated from the area. Finally, we would work with partners to develop a habitat management plan for the rare plant site to ensure that the rare plants are sustained over the long term.

Actions in Alternative B would have the same impacts as Alternative A. However, through better planning, increased monitoring and evaluation, and increased invasive plant control, this alternative ensures more successful grassland restoration and better long-term protection of the rare plant site.

Alternative C

Same as Alternative B

Alternative D

Alternative D proposes the same acres for grassland restoration as Alternative A, but proposes only biological or mechanical treatments. This would address public concerns about the use of chemicals in the environment and the potential impacts of fire on air quality. With the aggressive nature of invasive plants and their dominant presence on the Refuge in the past, all techniques are typically used in combination to establish and maintain successful habitat areas in a timely, cost-effective manner. Invasive plants have become so pervasive in these ecosystems that they need frequent, thorough treatments. With only mechanical and biological treatments available to maintain early successional habitat and treat invasive plants, we predict controlling invasive plant species would be severely hampered, and the failure of maintaining the proposed 220 acres in early successional habitat. Labor intensity/acre is much greater with mechanical treatments compared to prescribed fire. Limitations in the equipment would restrict access to some areas that can only be reached with fire or chemicals. We predict that relying on mechanical treatment alone would reduce the treatment area by 30 percent, to 154 acres. Success of the habitat projects would be compromised without the use of all tools, as would the ability to manage all the acres proposed within the given time frames.

Using only mechanical and biological treatments, we also predict a greater patchwork of habitats would result, as areas inaccessible to the tractor would become shrub or forest. In general, more edge habitat would be created. While some species favor edge habitat, such as deer, increased patchiness would limit the ability of the restoration area to provide for target grassland birds, such as the upland sandpiper and grasshopper sparrow, which need large (> 100-acre) contiguous grassland patches for nesting. Edge habitats are already widely distributed in this area and are favored habitats for predatory species, such as brown-headed cowbirds, foxes, and raptors.

As stated under Alternative A, direct and indirect benefits to grassland dependent species would occur over the long term. Many grassland bird species which breed in grassland patches less than 100 acres, such as bobolink and eastern meadowlark, would directly benefit. Shrub and edge dependent species would not be impacted to the extent predicted for Alternatives A, B and C, since Alternative D would likely result in a more patchy habitat mosaic.

Similar to Alternative A, this alternative would relocate the Refuge trail that threatens the rare plant site. This action would minimize the direct impact from trampling, but does not otherwise plan for long-term protection and maintenance of the site.

Summary

Alternatives B and C would equally provide the greatest benefit to establishing and sustaining a grassland restoration program and protecting rare plant habitat on Ninigret Refuge. These alternatives best meet the intent of Goal 2 for Ninigret Refuge and work to support the Connecticut River/New York Bight priority tasks of increasing coastal sandplain grasslands and reducing invasive plants. Alternative A restores the same number of grassland acres, but would not provide for the long-term sustainability of the restoration. Alternative D provides the least assurance of providing and sustaining expansive grassland habitats.

Biological Resources—Threatened and Endangered Wildlife Species and Other Species of Management Concern

Alternative A (Current Management)

The only Federal-listed species known to occasionally breed on or immediately adjacent to the Refuge is the piping plover. In recent years, the nest sites have actually been on the adjacent Ninigret Conservation Area (NCA) which, along with the Refuge beach, are managed as one site and recognized in the Recovery Plan as one piping plover nesting area. Eight piping plover pairs nested in 1999, with an average fledgling rate of 3.1 fledglings/nesting pair (USFWS 1999). These numbers represent the highest occupancy and productivity rate on this site since 1992. The long-term Recovery Plan goal is to maintain a 5-year average of 1.5 chicks fledged/nesting pair. A field evaluation determined the maximum provisional piping plover nesting capacity on this site is 20 pairs (Hecht 1999).

Alternative A would continue the current strategy of installing symbolic fencing around potential territories and restricting public access once courtship behavior is observed. The fence would remain until the young have fledged. Predator fence exclosures would be placed around the immediate nest site. ORV use would continue to be restricted from beaches under State regulations. These are all actions recommended in the 1996 Atlantic Coast Piping Plover Revised Recovery Plan. While these actions directly afford protection to nesting piping plover over the short term, they do not otherwise enhance foraging or nesting habitat at this site over the long term.

Alternative A would continue to improve the quality and quantity of existing grasslands on the Refuge. Grassland birds, including the State-listed upland sandpiper and grasshopper sparrow, are focal species of concern for the 220-acre grassland restoration project. These and other grassland associated species have realized dramatic declines in conjunction with the regionally significant declines in large grassland complexes. Robert Askins (1997) states that, in comparison to forest associated birds, "...grassland bird species, some of which are Neotropical migrants, generally have shown more consistent and severe declines" in the Northeast. Breeding Bird Survey results indicate a 38-percent decline in bobolinks and a 69-percent decline in grasshopper sparrows in New England over the last 25 years (Vickery 1997).

Other wildlife which would benefit from creating grassland habitat include certain mammals, butterflies, and other invertebrates which use these areas during all or part of their life cycle. Grasslands support high populations of small mammals, such as meadow voles and meadow jumping mice which, in turn, provide an important food source for raptors including kestrels, northern harriers, and owls. Larger mammals such as deer and red fox would use the fields for foraging. Grasslands and other early successional habitats support butterflies such as tiger swallowtails, monarchs, and fritillaries, due to the increased proportion of wildflowers.

We recognize that some wildlife species would be directly impacted over the short term, while major restoration and maintenance work is occurring. Mobile species would be displaced temporarily, while less mobile species would be directly impacted. Species that cling to vegetation would be affected the most. No treatment method, including mechanical and prescribed fire, would impact species that occur below 16 inches of soil. None of the known, less mobile small mammals and invertebrates are Federal-listed as threatened or endangered.

While the probability is low, amphibians may be impacted by the asphalt removal project if they are using the drainage ditches. Unfortunately, the ditches have not been surveyed extensively for amphibians. However, we do know the flow of water in the ditches is inconsistent and, with steep vegetated banks and a rock bottom, the probability of amphibians relying on the ditches is low. The drainage ditches are designed to carry runoff from the runway to Ninigret Pond. With asphalt removal, we predict that water would either pond or percolate directly on site and the ditch flow would be drastically reduced. In rare instances, some individual amphibians may be impacted to the point they migrate to more suitable locations. The freshwater ponds on the Refuge, which provide a more reliable water source and better quality habitat for amphibians, would not be impacted (Paton 1998).

Considering the above factors, the overall impact on amphibians would be very limited in scope and intensity, with only poor or marginal quality habitat in the drainage ditches to be altered. The highest quality habitat in the freshwater ponds would not be altered.

Alternative B (The Proposed Action)

Alternative B would maintain the piping plover nest protection strategy outlined in Alternative A, but would implement additional actions designed to decrease the likelihood of predation and human disturbance to nesting piping plover.

Predators remain one of the top two causes of nest failure, abandonment, and direct chick loss on South Shore beaches (USFWS 1999). Alternative B would develop an integrated piping plover predator management plan to comprehensively evaluate predator management, including outreach to adjacent landowners (who may inadvertently contribute to increased predator populations), lethal and non-lethal control techniques, and increased monitoring for predator activity at plover nest sites. Until the integrated plan has been completed, Alternative B would continue trapping predators near nest sites in an attempt to directly benefit piping plover nest productivity. The extent of opposition to trapping is not known, but would be determined during the public comment period upon release of this draft CCP/EA.

To further reduce direct impacts from predators and human disturbance on nest sites, we would also recommend to RI DEM that they move a campground from State land near suitable nesting habitat on the Refuge and Ninigret Conservation Area towards the Charlestown Breachway and other concentrated human activity. Trash and food scraps left behind at campsites attract predators like fox, crow, and racoon. Those three species were implicated in the high nest failure at the East Beach-Watch Hill nesting site in 1999 (USFWS 1999). Unleashed pets from campsites can also wreak havoc at nesting sites. We do not predict adverse public reaction to moving the campground, as long as the same number of camping sites can be established in the new location.

These measures strive to maintain or exceed the occupancy and productivity rates of 1999, which were the highest at the Ninigret site since 1992. They would directly benefit piping plover nesting on this site over both the short and long terms, assuming other factors affecting piping plover remain relatively constant (e.g., wintering habitat conditions, unusual storms, an explosion in predator populations, etc.)

Declining grassland birds, including the State-listed upland sandpiper and grasshopper sparrow, are focal species for the grassland restoration project. Alternative A, above, describes impacts on these species, and corresponding impact on shrub species. Alternative B would not directly impact waterfowl, but its wetland improvement projects would indirectly impact them as noted above.

The wetland restoration project proposed for approximately 1 acre of asphalt runway would directly benefit amphibians. The restored wetlands would also contribute to the existing network of freshwater ponds, providing new dispersal or breeding habitat for amphibians.

Mammals, especially those that rely on early successional habitat, would benefit from the restoration of asphalt runway to native habitats. Alternative B proposes to work with RI DEM, the Town of Charlestown, and adjacent landowners to develop a deer management plan for the area including and surrounding the Refuge. We expect deer to increase their use of the Refuge and its edge with continued residential development in South County. This alternative would set habitat, human health and safety objectives and other management objectives to ensure that deer populations stay within the carrying capacity of the habitat.

Without management of deer populations, we expect excessive browsing on native vegetation, impacts on residential landscaping, and increased threats to human health and safety from Lyme disease or vehicle-deer collisions. We may recommend a deer hunt in the future, but would base it on population objectives to maintain deer numbers within habitat limits or to directly reduce human health and safety threats. Opening the Refuge to a deer hunt would require a separate environmental assessment with specific proposals, compatibility determination, public comment and review, and an annual plan.

Alternative B proposes we acquire from willing sellers, or cooperatively protect with conservation partners, up to 500 acres of land within Focus Areas associated with Ninigret Refuge. We delineated the Focus Areas for their biological or ecological importance. They either support a concentration of species of concern, or provide an important habitat link to larger, protected conservation areas.

The Focus Area surrounding Ninigret Refuge links the Refuge to the RI DEM-managed Burlingame State Park, Burlingame Wildlife Management Area (State), and the Audubon Society's Kimball Refuge. Protecting extensive (greater than 100 acres), contiguous forested habitat would provide significant benefits to forest interior species, especially those with large home ranges, and would provide breeding habitat for several mature forest landbirds of concern, such as cerulean and worm-eating warbler, wood thrush, and Louisiana water thrush. These positive impacts would occur over the long term, as this habitat is protected from development and further fragmentation.

Alternative C

Alternative C is designed to increase the probability that piping plover would nest in the area by installing symbolic fencing from mean high tide inland to the dunes along the Refuge beach from April 1 to September 15 each year. This action would fence off a much larger section of beach than proposed under Alternatives A and B, and would install fencing regardless of courtship behavior early in the season. All other benefits to piping plover from increased predator management and moving the State campground would be similar to Alternative B. The predicted public reaction to moving the campground would be the same as Alternative B, while fencing the beach regardless of piping plover courtship behavior might raise a small amount of public opposition.

Impacts on grassland birds, waterfowl, and amphibians would be similar to Alternative B. The proposed deer management plan identified in Alternative B would also occur under Alternative C.

Alternative C would seek to acquire up to 760 acres from willing sellers in the Focus Areas associated with Ninigret Refuge, with emphasis on barrier beach and salt pond protection, and to maintain contiguous forested habitat. Benefits to forest interior species, as described in Alternative B above, would occur over the long term as land is protected from development.

Alternative D

Same as Alternative A, except that habitat management actions would not include the use of herbicides or prescribed fire (see *Vegetation* under Alternative D, above).

Summary

Alternative C provides the greatest benefit to species of management concern, and best meets the intent of Goal 1 for Ninigret Refuge. Alternative B would rank second, followed by Alternative A, then Alternative D. Section 7 consultation, to ensure compliance with the Endangered Species Act, is being undertaken with release of this draft CCP/EA.

Cultural Resources

Alternative A (No Action)

Native American cultural resources have been considerably affected by the extensive construction that occurred with developing and maintaining the Charlestown Naval Auxiliary Landing Facility. Only a few areas on Ninigret Refuge still have intact soils. One site is listed on the National Register of Historic Places for its significance as a Narragansett Indian shellfishing site. A second site was recorded with the Rhode Island Historic Preservation and Heritage Commission because it was considered a burial site for the Narragansett Indians. Surveys have been limited in area and scope. No management actions are proposed that would adversely impact the integrity of known sites.

Alternative A proposes no management actions that would enhance our knowledge of cultural resources or improve management on Ninigret Refuge. We would survey all future, ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act. We expect neutral impacts on cultural resources over the short and long terms.

Alternative B (The Proposed Action)

Alternative B proposes to conduct a cultural resources overview of the Refuge Complex, train more Refuge staff in Archeological Resource Protection Act enforcement, and conduct an extensive field investigation of Ninigret Refuge. In addition, Alternative B proposes to develop a partnership agreement with the Narragansett Indian Tribal Council. These actions would directly benefit cultural resources over both the short and long terms by increasing information available to Refuge staff, identifying new sites, and improving protection of recorded sites.

As with Alternative A, we would survey all future, ground-disturbing projects to comply with Section 106 of the National Historic Preservation Act.

Alternative C

The impacts noted for Alternative B would be the same under Alternative C. In addition, Alternative C would indirectly increase cultural resource protection through development of an environmental education curriculum for use in local schools and development of interpretive programs on the Refuge. We would survey all future ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act.

Alternative D

Alternative D would indirectly benefit the cultural resources program through the development of a partnership agreement with the Narragansett Indian Tribe and through development of an environmental curriculum for use in local schools. Interpretive materials on the Refuge would also be improved. Each of these actions would improve the ability of Refuge staff to disseminate information on the protection of cultural resources.

Summary

Alternative C provides the greatest benefit to the Cultural Resources program, followed by Alternative B, then Alternative D and, least of all, Alternative A. All alternatives would comply with the Archeological Resources Protection Act. A Section 106 review, to ensure compliance with the National Historic Preservation Act, would be undertaken with release of this draft CCP/EA.

Public Use

Alternative A (Current Management)

A few changes to current public use would occur as a result of implementing existing, approved plans. Specifically, as current funding and staffing allows, the barrier-free “Trail Through Time” would be completed. The trail system would be reduced from more than 5 miles to 3.8 miles with elimination of unnecessary, redundant trails and the portion that impacted rare plant habitat. With trail completion, the 1997 environmental assessment decision was to eliminate biking and dog walking on the Refuge.

That change in trail use would negatively impact visitors who are used to biking and dog walking in the area. However, many other visitors would positively benefit, especially those who require a barrier-free accessible trail. Visitors requiring a wheelchair or walking aid would realize an improved experience in the absence of bicyclists and dogs, who may compromise their safety. Very few opportunities along the coast of Rhode Island provide barrier-free accessibility in a natural environment.

We expect a 10-percent increase in of visitor use on the Refuge, commensurate with the estimated 10-percent increase overall on the Refuge Complex following completion of the Visitor Center in 2003. Other public uses would remain unchanged under Alternative A. Surf fishing from the Refuge shoreline on the barrier beach would continue, with a seasonal closure if piping plovers nest on the Refuge beach. Access for recreational fishing and shellfishing in Ninigret Pond would continue in accordance with State and Refuge regulations. Hunting would not be allowed. The current cooperative partnerships for environmental education would continue.

There would not be any additional Refuge staff or funds available to assist in public use or visitor services. Environmental interpretation, wildlife observation and photography would continue on existing facilities until the “Trail Through Time” has been completed, at which time unnecessary trails would be eliminated.

The most prevalent non-wildlife-dependent uses at Ninigret Refuge are dog walking, bicycling, jogging, swimming and sunbathing, and ORV use on the barrier beach portion of Refuge property. Additional non-wildlife-dependent uses identified at Ninigret Refuge include kite flying, berry picking, fireworks, and model rocket launches.

Staff shortages have limited our ability to address non-wildlife-dependent activities. Alternative A would continue limited enforcement of these unauthorized uses since no additional staff or operating funds would be provided to address non-wildlife-dependent uses. We predict an increase in the level of non-wildlife-dependent uses, corresponding with the 10-percent increase in overall visitation on the Refuge Complex. Continued lack of enforcement would benefit non-wildlife-dependent users, however, we expect an increasingly negative impact on the quality of experience visitors engaging in wildlife-dependent uses.

Overall, Alternative A would result in very little change to the types of activities occurring on or planned for the Refuge. Limited enforcement of non-wildlife-dependent activities would continue, and is predicted to result in an increase in user conflicts and a decrease in the quality of visitor experiences.

Alternative B (The Proposed Action)

Alternative B proposes to increase public use opportunities on Ninigret Refuge in several ways. In addition to actions outlined in Alternative A, we would develop a Refuge Complex Visitor Services Plan to address program needs, opportunities, identify target audiences, establish thresholds for impacts on wildlife and habitats, and determine how to evaluate success. We would also establish formal partnerships to address visitor service planning and funding.

A new public waterfowl hunting opportunity would be provided by opening of Coon Cove and the barrier beach marshlands (Ninigret Pond side) to hunting. Hunting, by boat access only, would occur according to State regulations and cooperatively administered with RI DEM. Since Federal governments establish waterfowl seasons and limits by flyway, and because the proposed area would accommodate only a few hunters each day, we expect no adverse impacts on waterfowl populations. We predict no impact on non-target species, due to the season and location of use. We do not expect this activity to impact other wildlife-dependent users on the Refuge, because these areas are not adjacent to portions of the Refuge with trails.

This CCP/EA serves as the environmental document and compatibility determination for the hunting proposal. If this alternative is selected, we will publish a notice in the Federal Register and prepare an annual plan to allow hunting in the Fall 2001 season.

This alternative does not propose public deer hunting. After completion of a deer management plan with RI DEM, the Town of Charlestown, and adjacent landowners, we would reevaluate the need for a deer hunt. We would base the objectives of the deer hunt on the need to maintain deer populations within an established carrying capacity and to reduce threats to human health and safety. However, a separate environmental assessment, compatibility determination, public review and comment, and annual hunt plan would be completed before implementation.

While Alternative B does not propose any changes to fishing opportunities at Ninigret Refuge, it proposes to designate trails to fishing access points on Ninigret Pond. Designating trails would not change the current access points on the mainland shoreline on Ninigret Pond, and would have no effect on the fishing use of Ninigret Refuge. Alternative B would require commercial shell fishermen to operate under a special use permit for access through the Refuge, as required by Service policy. There have been no problems with existing, known levels of commercial use. However, the use of permits would allow for a better determination of use and monitoring of impacts. We do not expect compliance with that policy to negatively affect commercial shellfishing.

Alternative B proposes expanding the environmental education opportunities at Ninigret Refuge by developing outdoor classroom sites that would feature grassland restoration and salt pond ecology. Alternative B would continue the formal partnership for environmental education with the non-profit Frosty Drew Nature Center, but proposes to evaluate the current commercial use of Ninigret Refuge for environmental education by the private, for-profit "Biomes" company. We would also develop an environmental education facility for the Refuge Complex. The combination of the proposed actions would result in a positive impact on the environmental education programs on Ninigret Refuge.

Alternative B would develop and fund an interpretive plan for Ninigret Refuge to address the need for better quality interpretive pamphlets and displays along trails. This would greatly expand opportunities for environmental interpretation and would improve the visitor experience at Ninigret Refuge.

Under Alternative B, the Trail Through Time would be funded and completed by 2002, and would include one or more new observation platforms along the trail. We would also develop watchable wildlife literature and a self-guided wildlife interpretive pamphlet. These would combine to greatly enhance the wildlife observation experience for Refuge visitors and would have a positive impact on public use.

On newly acquired lands, we would allow the six priority wildlife-dependent public uses to continue on an interim basis unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have occurred before acquisition.

Under Alternative B, all inappropriate and incompatible non-wildlife-dependent public use on the Refuge would be phased out by 2005. An outreach campaign to eliminate dog walking and bicycling would occur starting in 2001. Dog walking, as observed on Ninigret Refuge, can be very disturbing to wildlife. Dog walkers on the Refuge often let their dogs run free, and Refuge volunteers frequently observe dogs chasing wildlife on the Refuge. In addition, many Refuge visitors do not like to be confronted by dogs, or their feces, while observing wildlife on Refuge trails.

Bicycles pose a safety problem for pedestrians, in particular those in wheelchairs or with walking aids. Refuge policy has allowed bicycles on the former runway because they are 200 feet wide and potential conflicts with the walking public were minimal. The newly refurbished wildlife observation trail is not wide enough to safely accommodate bicycles and pedestrians. While prohibiting bicycles would impact those visitors used to riding, we expect that the change would improve the quality of experience for other Refuge visitors.

In addition to bicycling and dog walking, incompatible or non-wildlife-dependent activities like jogging, swimming and sunbathing, kite flying, berry picking, firework use, and model rocket launches would be eliminated by 2005. None of these activities support a priority public use, nor do they meet the goals of the Refuge or contribute to the purposes for which Ninigret Refuge was established. Further, these activities diminish the quality of experience for visitors engaged in priority public use activities, and in the case of dog walking, could have an adverse impact on wildlife and habitat quality. None of these activities are compatible with the Refuge purpose, and would be eliminated. Overall, Alternative B would improve priority, wildlife-dependent public uses, while eliminating all non-wildlife-dependent public use and providing for increased wildlife and habitat values at Ninigret Refuge.

Alternative C

Alternative C would reduce the overall level of public use on Ninigret Refuge in order to minimize the risk of disturbance to wildlife and habitats on Refuge lands. While Alternative C proposes to reduce many wildlife and non-wildlife-dependent uses, it emphasizes interpretation and educational opportunities to make Refuge visitors better stewards of wildlife and habitat. We would improve environmental education opportunities at Ninigret Refuge by developing outdoor classrooms and a curriculum-based education program for schools, featuring grassland restoration and salt pond ecology. These actions would result in a positive impact on environmental education at Ninigret Refuge.

Alternative C also restricts environmental interpretation, wildlife observation, and photography to the newly constructed Trail Through Time in order to reduce disturbance to wildlife in other areas of Ninigret Refuge. This would result in fewer opportunities for public use but would increase wildlife and habitat values of the Refuge.

Like Alternative A, this alternative proposes to continue to allow public use without a visitor services plan and would propose only a few new public use projects for Ninigret Refuge. Hunting and fishing opportunities and associated impacts would be similar as those proposed in Alternative B.

Alternative C proposes the most aggressive schedule of eliminating all inappropriate and non-wildlife-dependent uses. By 2001, dog walking and bicycling would be eliminated. By 2002, all other non-wildlife-dependent activities would be eliminated. Increased law enforcement would ensure compliance with the changes in public use. We expect this proposal to generate a lot of public concern about restricted use of the Refuge. The extent of public concern will be determined during the public comment period upon release of this draft CCP/EA.

On newly acquired lands, we would allow priority wildlife-dependent public use to continue on an interim basis unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Overall, Alternative C would reduce public use opportunities on the Refuge to minimize the risk of disturbance to wildlife and habitats.

Alternative D

Alternative D proposes to substantially increase resources for improving priority public uses, while working within our legal framework and compatibility mandates for Ninigret Refuge.

In addition to the actions proposed in Alternative B, a public deer hunt would be implemented under special regulations established by the Refuge (Refuge Regulations 50 CFR 32). We would also evaluate the potential for small game hunting at Ninigret Refuge.

These actions would substantially increase hunting opportunities, since none currently exist on the Refuge. The hunting public would directly benefit from this proposal, especially since areas open to hunting are declining throughout Rhode Island.

As natural habitats diminish, deer use on the Refuge will increase and active management of deer populations will become even more important. Opening Ninigret Refuge to deer hunting would help to keep deer within their habitat carrying capacity, ensuring that they do not damage native vegetation or residential landscaping. Further, a reduction of the deer herd would help reduce vehicle-deer collisions and the public health concern from deer ticks and Lyme disease.

Not only does hunting support one of the six priority public uses identified in the Refuge System Improvement Act, but an established, annual hunting program would provide direct benefits to the local economy. As described in our publication "National Survey of Fishing, Hunting, and Wildlife-Associated Recreation" (1996), hunters in Rhode Island contribute an average of \$75/trip directly to the local economy in the form of food, lodging, and transportation purchases, not to mention the purchase of licenses and equipment. However, other Refuge visitors would likely be impacted. We predict that other activities would be restricted during hunting season, to avoid a safety hazard and user conflicts. Archery only areas would reduce the perceived threat by the general public that hunting is a risk to human health and safety. In addition, during public involvement for this draft CCP/EA, some individuals expressed opposition to any form of hunting on the Refuge. We do not know the extent of that opposition. However, Service policy requires preparation of a separate environmental assessment with specific actions and locations, a compatibility determination, public review and comment, and an annual hunt plan before a new hunt can be implemented. That separate assessment would determine the level of public concern and the potential impacts on other Refuge visitors. We would begin the environmental assessment in 2001.

Opportunities for environmental education, environmental interpretation, and wildlife observation and photography are the same as those proposed in Alternative B. These actions would greatly enhance the quality and quantity of public use opportunities.

Like Alternative B, Alternative D proposes to eliminate current non-wildlife-dependent uses. Consequences of this action are similar to Alternative B; some visitors would be impacted, but the quality of experience for most visitors engaged in wildlife-dependent activities would be enhanced over the long term.

On newly acquired lands, we would allow priority wildlife-dependent public use to continue on an interim basis, unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Summary

Alternative D would provide the greatest positive impact on priority public uses because of the increases in all program areas. It would dedicate a major increase in funding and staffing resources to those programs. However, that emphasis would result in a greater potential risk of disturbance to wildlife and habitats. The extent of that risk is not known, but monitoring and evaluation would be an important part of implementation. Alternative B would also result in increased opportunities for priority public use, but would continue to implement wildlife and habitat projects as a higher priority. Alternative C would provide the fewest benefits to public use, focusing almost exclusively on wildlife and habitat projects. Alternative A would not change current public use opportunities or wildlife and habitat values. Alternative B provides the best balance in meeting Goals 1 and 4 by increasing public use opportunities at minimal risk to wildlife and habitat values.

Chafee Refuge

Physical Resources—Soils, Hydrology, and Wetlands

Alternative A (Current Management)

Alternative A would not alter soils. We predict no direct or indirect impacts on this resource.

Land acquisition under Alternative A would provide a positive impact through restoration and protection of the hydrology and wetlands of the area. An additional 377 acres have been approved for Service acquisition within the watershed. Service land acquisition would preclude residential development, including roads and other infrastructure. Failing septic systems have been implicated as one of the most significant contributions to water quality problems in the river. Our acquisition of undeveloped uplands and wetlands is helping to protect the integrity of the watershed over the long term.

Improving water quality in the Narrow River continues to be a State priority. The State conducts water quality monitoring twice a year. A March 22, 2000 article in the Narragansett Times states "...[the] river has consistently failed to meet RI DEM standards for fecal coliform, an indicator of bacterial contamination." Pettaquamscutt Cove is one of two areas having the highest concentrations of fecal coliform bacteria in the watershed. As a result, portions of the river are closed to shellfishing and recreational uses like swimming.

Alternative B (The Proposed Action)

Alternative B would not directly alter soils. Indirectly, however, we would attempt to minimize shoreline erosion by working with RI DEM and the Town of South Kingstown to implement a "no wake" zone in Pettaquamscutt Cove and the lower Narrow River. The waves created by motor boats and jet skis are having a noticeable, negative impact on the river banks.

Our land protection strategy would help protect the integrity of the watersheds. Approximately 1,000 acres within the Narrow River and Point Judith Pond watersheds would be acquired from willing sellers. As with Alternative A, our acquisition would preclude residential development. Failing septic systems, animal wastes, and lawn chemicals are suspected as the leading causes of poor water quality and degraded habitat conditions in the Narrow River and Salt Pond Region (CRMC 1998). Staff participation in the interagency watershed planning recommended by CRMC would also indirectly contribute to long-term watershed protection.

Alternative C

Under Alternative C, we would acquire 3,000 acres more within the Narrow River and Point Judith Pond watersheds, proportionately increasing potential benefits. The increased protection for undeveloped uplands and wetlands would greatly enhance our ability to maintain or improve the integrity of these watersheds over the long term. Service acquisition would preclude residential development, the leading cause of poor water quality conditions in these watersheds.

Alternative D

Same as Alternative A.

Summary

Alternative C would provide the greatest, positive long-term benefits to watersheds, hydrology and soils, primarily through land acquisition. Alternative B would provide the next greatest benefit, followed equally by Alternatives A and D. All alternatives would comply with the Clean Water Act.

Biological Resources–Vegetation*Alternative A (Current Management)*

No specific actions would change the existing vegetation on Chafee Refuge. Alternative A would maintain the status quo (no impacts on vegetation).

Alternative B (The Proposed Action)

With the exception of invasive plant control, Alternative B does not propose specific actions to change the existing vegetation in the near future. We would develop a grasslands plan by 2008 to identify future restoration possibilities. We would also pursue opportunities for cooperative grasslands management with adjacent landowners and consider further grasslands restoration opportunities with new acquisition of grassland habitat.

Invasive plant control would be actively pursued with these alternatives, directly improving the vegetative condition over the long term. Control of invasive plants such as Phragmites, autumn olive, and Asian bittersweet provide the greatest challenge. Mechanical, chemical, prescribed fire, and biological treatments would all be implemented. These treatments would occur under conditions that would minimize their impact on other resources.

Mechanical treatments would avoid putting heavy equipment in wetlands or hydric soils. The Regional Contaminants Specialist would review and approve our use of chemical herbicides. We would use prescribed fire only under the stipulations in the 1995 Fire Management Plan. Biological treatments would use species with a known, negligible risk to native vegetation and native invertebrates. None of these treatments would occur under conditions that would adversely affect native vegetation or other natural resources on Chafee Refuge.

Alternative C

Same as Alternative B, except that the increased land acquisition proposed would serve to maintain more acres in undeveloped, native habitat types, further protecting biological diversity.

Alternative D

Same as Alternative A.

Summary

Alternative C would provide the greatest potential benefit to vegetation on Chafee through invasive plant treatments, habitat restoration, and Service land acquisition and protection. Alternative B would provide the second greatest benefit, followed equally by Alternatives A and D.

Biological Resources–Threatened and Endangered Species and Other Species of Management Concern*Alternative A (Current Management)*

No Federal-listed threatened or endangered species occur on Chafee Refuge. The nearest documented occurrence is the piping plover nesting site at the mouth of the Narrow River.

Current management is not directed towards specific species or habitats, and includes only minimal monitoring and inventorying (see *Alternatives Comparison Matrix*, Chapter 3). The Refuge would continue to have very little information about population levels, distribution, and habitat use. Since no specific management actions are proposed to benefit species of concern, Alternative A would maintain the status quo, with no direct impacts on species and habitats of concern.

Indirectly, however, the 377 acres proposed for Service acquisition from willing sellers would result in long-term positive benefits to wildlife through habitat protection. Land protection precludes a direct loss of upland and wetlands habitat from residential development. Protecting and managing threatened and endangered species and wetlands would be a priority for future land acquisition. Aquatic and estuarine resources in the Narrow River and Pettaquamscutt Cove would indirectly benefit as well.

Alternative B (The Proposed Action)

Similar to Alternative A, no management actions are proposed that would directly impact species and habitats of management concern. Indirectly, however, Alternative B would benefit wildlife and habitat through actions related to increased land protection, increased baseline biological surveys, and development of a cooperative waterfowl management plan.

Alternative B proposes we acquire up to 1,000 acres within the Narrow River and Point Judith watersheds. Protection and management for threatened and endangered species and other trust resources would be a priority of future land acquisition. That appreciable increase in acres over Alternative A would contribute to protection of wildlife habitat over the long term. We would prioritize and implement baseline biological inventories. Chafee Refuge would be a priority, since we know very little about the quality of habitat and the presence of many of the species identified in Appendix A.

Alternative B proposes to cooperate with RI DEM on a waterfowl management plan in the lower Narrow River and Pettaquamscutt Cove. The plan would evaluate the quantity and quality of habitat, primarily for wintering waterfowl, seek to ensure that adequate resting areas are available to waterfowl, in particular black duck, and evaluate the potential for appropriate hunting opportunities. Pettaquamscutt Cove was designated a focus area for black duck protection and management in the North American Waterfowl Management Plan- Black Duck Joint Venture (NAWMP 1988). Wintering black duck and other waterfowl would realize long-term, indirect benefits from comprehensive evaluation of habitat.

Alternative B also proposes to cooperate with RI DEM, Town of South Kingstown and adjacent landowners on a deer management plan for the area including and surrounding the 120-acre "Foddering Farms" parcel. We expect increased deer use on the Refuge as residential development diminishes habitat. That plan would set habitat, human health and safety objectives, and establish the carrying capacity of the habitat to support deer. Excessive browse on vegetation, impacts on residential landscaping, increased threats to human health and safety from Lyme bearing deer ticks, and vehicle-deer collisions are possible without managing deer populations. The management plan may recommend a deer hunt, based on population objectives related to habitat carrying capacity or to directly reduce health and human safety threats. If recommended, opening the Refuge to a deer hunt would require a separate environmental assessment outlining specific actions, a compatibility determination, public review and comment, and an annual hunt plan before implementation.

Alternative C

Alternative C proposes the greatest level of Service land acquisition and cooperative watershed-level planning, further increasing protection and management for species and habitats of management concern in the Narrow River and Pt. Judith watersheds.

Alternative C proposes we acquire up to 3,000 acres in the Narrow River and Point Judith Pond watersheds. As stated above, land protection indirectly benefits many resources in these watersheds, since it precludes residential development and associated impacts.

Alternative C proposes to cooperate with RI DEM on closing all of Pettaquamscutt Cove to waterfowl hunting to establish a year-round waterfowl rest area. The area is already recognized as significant to wintering waterfowl, most notably black ducks, a species of special management concern.

Alternative D

Same as Alternative A.

Summary

None of the alternatives propose management actions to directly benefit species of concern. Alternative C provides the greatest indirect benefits over the long term to species and habitats of management concern through increased land protection and a proposal for a waterfowl rest area. Alternative B provides the second greatest level of indirect benefits, followed equally by Alternatives A and D. Section 7 consultation, to ensure compliance with the Endangered Species Act, is being undertaken with release of this draft CCP/EA.

Cultural Resources

Alternative A (Current Management)

No proposed management actions would enhance cultural resource information or management on Chafee Refuge. We would survey any future ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act. We expect neutral impacts on cultural resources over the short and long terms.

Alternative B (The Proposed Action)

Alternative B proposes a cultural resources overview of the Refuge Complex and training of more Refuge staff in Archeological Resources Protection Act enforcement. These actions would increase the information available to Refuge staff and would improve enforcement of known sites listed by the Historic Preservation Office. We know of none on the Refuge. As with Alternative A, we would survey all future, ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act. These actions would indirectly benefit cultural resources over the long term on Chafee Refuge.

Alternative C

Alternative C proposes to conduct cultural resource field surveys on the Refuge in addition to the cultural resources overview, and would provide greater protection of sites through increased law enforcement. Alternative C would also develop an environmental education curriculum associated with cultural resources of Pettaquamscutt Cove. Each of these actions would result in a positive, indirect, long-term benefit to the cultural resources program.

Alternative D

No proposed management actions would directly benefit cultural resources. However, Alternative D would indirectly benefit these resource over the long term through increased environmental education and interpretive materials, and through a formal partnership with the Narragansett Indian Tribe.

Summary

Alternative C provides the greatest level of direct and indirect benefits to cultural resources over the long term. Alternative B would result in the second greatest level, providing indirect benefits only, followed by Alternative D and Alternative A. All alternatives would comply with the Archeological Resources Protection Act. A Section 106 review, to ensure compliance with the National Historic Preservation Act, would be undertaken with release of this draft CCP/EA.

Public Use

Alternative A (Current Management)

Chafee Refuge has the least public use of all the Complex Refuges. This is primarily due to the fact that the Refuge is comprised of small, disjunct tracts of land without boundary markers, and is predominantly wetlands. The lack of visibility and the extent of wetland make access difficult for most visitors. The Refuge has no designated trails or travelways.

Although we predict a 10-percent increase in visitation across the Refuge Complex, Alternative A would not change the type of activities allowed. No new public uses would be authorized on the Refuge, primarily because no infrastructure is in place, or planned. Of the six priority public uses, only saltwater fishing is now authorized, in accordance with State regulations. Further, Alternative A would not provide any additional Refuge staff or funds to assist in public use or visitor services.

We would evaluate priority, wildlife-dependent public uses on newly acquired lands on a case-by-case basis as lands are acquired. We would allow existing priority public uses to continue if found to be compatible. We would not allow new uses unless a formal compatibility determination has been completed.

The most prevalent, recurring, unauthorized use on Chafee Refuge is hiking across Refuge lands to reach the Narrow River shoreline. Some shoreline erosion problems have been noted, but have not been monitored to date. Other unauthorized and inappropriate uses, such as illegal dumping of household garbage and lawn debris, occur periodically. None of these concerns are addressed in Alternative A.

An adjacent off-Refuge public use has created a concern for the Refuge. We have identified a potential impact from the use of jet skis in open water adjacent to the Refuge. That activity creates considerable disturbance to wildlife. The speed and noise associated with jet skis cause waterfowl, wading birds, and other wetland species to flush from a considerable distance. In addition, other Refuge visitors are impacted by both the noise and disturbance to wildlife, especially if fishing from the shoreline. We have no jurisdiction over open water and jet skiing in the area, and can only make recommendations to the State. Alternative A would not address this concern.

Staff shortages have limited our ability to address non-wildlife-dependent activities. Alternative A would continue limited enforcement since no additional staff or operating funds are proposed. This would result in a negative impact on the quality of experience for wildlife-dependent Refuge visitors.

Another public use management issue at Chafee Refuge is the fact that none of the Refuge boundary is posted with standard Refuge boundary signs. The public has no way of distinguishing Refuge property. Under Alternative A, we would continue to post boundaries as funding and staff levels allow. No additional staff or funding would be available to properly post the boundary of Chafee Refuge.

Overall, Alternative A would result in very little change to the types of activities occurring on the Refuge. Limited law enforcement of non-wildlife-dependent activities would continue and would result in increased user conflicts. The Refuge boundary would remain virtually invisible to the public.

Alternative B (The Proposed Action)

Alternative B would increase priority public use opportunities on Chafee Refuge in several ways. We would develop a Refuge Complex Visitor Services Plan to address program needs, opportunities, identify target audiences, determine thresholds for impacts on wildlife and habitats, and determine how to evaluate success. We would also establish formal partnerships to address and facilitate visitor service planning and funding.

No hunting is proposed at this time. We would evaluate the potential for providing a new waterfowl hunting experience on the Refuge, following completion of the waterfowl area plan identified in Alternative B under its biological resources discussion. The purpose of the plan would be to evaluate the quantity and quality of habitat, primarily for wintering waterfowl. The plan would seek to ensure adequate resting areas are available to waterfowl, in particular black duck, and evaluate the potential for hunting opportunities commensurate with the quality and quantity of habitat protection. Pettaquamscutt Cove was designated a focus area for black duck protection and management in the North American Waterfowl Management Plan- Black Duck Joint Venture (NAWMP 1988). Specifically, we would develop this plan for the lower Narrow River and Pettaquamscutt Cove with RI DEM, the Audubon Society of RI, and the towns of South Kingstown and Narragansett. Waterfowl hunting is taking place on the South Kingstown side of Pettaquamscutt Cove and on State waters. The Narragansett side of the river is closed to hunting.

Refuge lands are relatively small, and even if they are opened to hunting, they could accommodate perhaps only two hunting blinds. Refuge lands alone would not provide a substantial increase in hunting opportunities. However, with fewer and fewer acres available for waterfowl hunting, RI DEM has expressed their continued interest in this activity on Refuge lands (Allin 1999 pers. com). While hunters would appreciate the increase, we recognize that a large segment of the Rhode Island population opposes hunting at Chafee Refuge. We heard several individuals state their opposition to hunting during the scoping phase of this draft CCP/EA.

In the future, another new opportunity for public hunting may arise as a result of the deer management plan proposed for Alternative B. That plan would evaluate the needs for deer population management in the area including and surrounding the “Foddering Farm” tract. We would base the objectives for any deer hunt on the need to maintain deer populations within an established habitat carrying capacity and reduce threats to human health and safety. Service policy requires preparation of a separate environmental assessment, compatibility determination, public review and comment, and an annual hunt plan before implementing either a new waterfowl or deer public hunt. The environmental assessment would evaluate the level of public opposition to hunting as well as impacts on non-target wildlife and visitors engaged in other wildlife-dependent uses.

Alternative B would benefit the fishing public by designating and promoting fishing access points to the shoreline, and would create a barrier-free fishing platform either on Refuge land or cooperatively with adjacent landowners, RI DOT, and RI DEM.

Alternative B would also cooperate with the RI DEM to develop a “no wake” zone in the Pettaquamscutt Cove and Narrow River to reduce shoreline erosion and minimize impacts on wildlife. It is important to recognize that we have no jurisdiction over open, navigable waters, and a “no wake” regulation is entirely at the State’s discretion. In conjunction, Refuge staff would develop a public education program to publicize the impacts of excessive motorboat and jet ski speed on Refuge resources. Wildlife-dependent public users and adjacent landowners would also benefit from reduced physical and noise impacts.

Alternative B proposes developing a curriculum-based environmental education program for classroom use, featuring the Narrow River estuary and Pettaquamscutt Cove. We would develop a formal partnership with South County Museum to conduct these programs. These actions would result in a positive impact on environmental education opportunities at Chafee Refuge.

Alternative B would develop environmental interpretation opportunities, since none now exist. The Refuge Complex Visitor Services plan would explore opportunities to improve literature and pamphlets available to the public, cooperate with partners on kiosks, barrier-free trails and viewing platforms, and canoe and kayak trails. Specifically, we would evaluate opportunities for an interpretive kiosk at the South County Museum, a kiosk and pullout at Middlebridge, and a kiosk and barrier-free trail at the former Bridgepoint Commons subdivision tract. Alternative B also would designate an interpretive canoe and kayak route through the Narrow River and Pettaquamscutt Cove to increase environmental interpretation of the estuary. Combined, these actions would greatly expand the opportunities for environmental interpretation, and would result in a positive impact on environmental interpretation, wildlife observation and photography.

On newly acquired lands, we would allow priority wildlife-dependent public use to continue on an interim basis if they meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all existing, non-wildlife-dependent activities on new Refuge lands. We would post all Refuge boundaries by 2005. This would raise the visibility of Refuge lands, minimize trespassing issues, and facilitate law enforcement. Consolidating shoreline access easements with adjacent landowners would also avoid current trespass problems.

We would phase out all inappropriate, incompatible, or non-wildlife-dependent public use on the Refuge by 2005. However, few individuals would be impacted, since current use is relatively low. Our primary concern is locating unauthorized trails and monitoring use.

Overall, Alternative B would result in a positive change to wildlife-dependent public uses by increasing opportunities in all programs and raising the visibility of the Service and the Refuge.

Alternative C

This alternative proposes only a few new priority public use projects related to environmental education and interpretation. These programs would focus on promoting better stewardship of natural resources. Other priority public uses would decrease or remain closed in order to minimize impacts on wildlife and habitats on Refuge lands.

Chafee Refuge would remain closed to all public hunting. Alternative C would also close the Refuge shoreline to fishing in order to avoid additional shoreline erosion and wetland trampling caused by the fishing public. We would allow fishing only from boats, in accordance with State regulations. That restriction would result in a negative impact on a few fishers that access the shoreline by crossing the Refuge.

Alternative C would implement the same environmental education programs proposed in Alternative B. Environmental interpretation would only be promoted through coordination of the proposed kiosk on the South County Bike Path where it traverses the south portion of Chafee Refuge. We predict hundreds of people a day would see the kiosk, which would be a significant increase in environmental interpretation.

Alternative C proposes eliminating all inappropriate and non-wildlife-dependent uses at Chafee Refuge by 2002, the most aggressive schedule of all the alternatives. This proposal would generate the most public concern, although the number of individuals directly affected would be relatively small, based on our current knowledge of public use. Alternative C would also provide staffing and funding to complete the boundary posting at Chafee Refuge so that the public could readily identify Refuge lands.

On newly acquired lands, we would allow priority wildlife-dependent public use to continue if they meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Alternative D

Alternative D proposes to substantially increase resources for improving priority public uses while working within our legal framework and compatibility mandates for Chafee Refuge. Similar to Alternative B, we would develop a Refuge Complex Visitor Services Plan to strategically develop and implement priority public use programs.

We predict visitation increases of 25 percent over current levels. This would result from dramatically expanded priority public use programs, and because the new Refuge Complex Visitors Center would raise the visibility of this Refuge considerably.

In addition to the actions proposed in Alternative B, Alternative D would implement a new waterfowl hunting opportunity. We would open Chafee Refuge to waterfowl hunting by boat access only, administered by the RI DEM under Refuge regulations. We may consider temporary floating blinds, but Refuge lands have limited capacity. This action would directly benefit the hunting public. Since Federal governments establish waterfowl seasons and limits by flyway, and because the area proposed would accommodate only a few hunters each day, we expect no adverse impacts on waterfowl populations. Nor, because of the locations of these proposed areas, the season of use, and the requirement of boat access only, do we predict an impact on non-target species. Further, we do not expect this activity to impact other wildlife-dependent users on the Refuge, because these areas are not adjacent to portions of the Refuge with trails.

We would implement a public deer hunt under special regulations established by the Refuge (Refuge Regulations 50 CFR 32) on the 120-acre "Foddering Farms" parcel. That area was hunted before we acquired it. This action would substantially increase hunting opportunities, since none exist on the Refuge. Areas open to hunting throughout Rhode Island are declining; thus, this proposal would directly benefit the hunting public.

As natural habitats diminish, use by deer on the Refuge will increase, and active management of deer populations will be even more important. Opening a portion of Chafee Refuge to deer hunting would help to keep deer within their habitat carrying capacity, reducing damage to native vegetation or residential landscaping. Further, reducing the deer herd would help reduce vehicle-deer collisions and the public health concern about deer ticks and Lyme disease.

Not only is hunting one of the six priority public uses identified in the Refuge System Improvement Act, but an established, annual hunting program would provide direct benefits to the local economy. As described in our publication, "National Survey of Fishing, Hunting, and Wildlife Associated Recreation" (1996), hunters in Rhode Island invest an average of \$75/trip directly into the local economy in food, lodging, transportation, licenses, and equipment.

Hunting would not conflict with other priority uses, since the Refuge is not open to any other uses. However, during public involvement for this planning process, some individuals have expressed opposition to any form of hunting on the Refuge. Service policy requires preparation of a separate environmental assessment with specific actions and locations, a compatibility determination, public review and comment, and an annual hunt plan before a new hunt would be implemented. That separate assessment would involve public scoping indicating the level of public concern, and also evaluating the potential impacts on non-target wildlife and other Refuge visitors. With Alternative D, we would begin an environmental assessment to establish both waterfowl and deer hunts in 2001.

On newly acquired lands, we would allow priority wildlife-dependent public uses to continue on an interim basis unless they do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before acquisition.

Overall, it is difficult to predict impacts on wildlife and habitat, or to evaluate a potential for conflict among different users, since information is so limited for this Refuge. We would develop a monitoring program in conjunction with the Refuge Complex Visitor Services Plan, to ensure activities do not result in unacceptable disturbances to wildlife and habitat over the short or long term. However, because of the expansive change to public use, Alternative D would cause the greatest potential disturbance to wildlife and habitats.

Summary

Alternative D would provide the greatest positive impact on priority public uses because of the increases in all program areas. However, that emphasis would result in a greater potential disturbance to wildlife and habitats. The extent of risk is not known, but monitoring and evaluation would be an important part of implementation. Alternative B would result in increased opportunities for priority public uses, but would continue to implement wildlife and habitat projects as a higher priority. Alternative C would provide the fewest benefits to public use, focusing almost exclusively on wildlife and habitat projects. Alternative A would not change current public use opportunities or wildlife and habitat values. Alternative B provides the best balance in meeting Goals 1 and 4 by increasing opportunities at minimal risk to wildlife and habitat values.

Sachuest Point Refuge

Physical Resources – Soils, Hydrology, and Wetlands

Alternative A (Current Management)

Soils, hydrology, and wetlands have all been impacted with historic practices. The former Town of Middletown dump site and the road to Third Beach both impacted wetlands, while the construction and maintenance of the Sachuest Point Defense Communications Facility and Firing Range impacted upland soils. Current habitat management practices are impacting soils as described below.

This alternative proposes to continue managing approximately 42 acres of early successional uplands through mowing, brush hogging, hydroaxing, prescribed burning, and chemical treatments. The soil types in these uplands sites are not susceptible to compaction, except under saturated conditions. Operations typically occur in late fall when these conditions are unlikely. No compaction from past mechanical treatments has been noted to date.

Prescribed fire has been used on a limited basis, but has not burned hot enough to meet the objective of invasive shrub reduction. All future burning would be conducted under the stipulations of the 1995 Fire Management Plan to ensure meeting resource objectives.

Herbicides, namely Garlon 4, have been used with limited success in these upland areas to treat invasive plant species such as Asian bittersweet. The Regional Contaminants Specialist, who is responsible for upholding Federal standards for water quality and soil protection, annually reviews and approves chemical herbicide use. Considering all potential treatment methods, we expect negligible impacts on upland soils, limited in duration and intensity, and confined to the project area. We expect none of the proposed actions to adversely impact soils over the long term.

Alternative A proposes to continue work with the U.S. Geological Survey, Biological Resource Division, to monitor the 15 acre wetlands restoration project initiated in 1998. The project involved manipulating a culvert and tidal creek channel to restore tidal flow to the area, and the mechanical scarification of Phragmites, an invasive plant species that dominated the area. The 1999 Monitoring report indicates that with one year of restored saltwater flow, Phragmites was greatly reduced in height, density and vigor, and native fish like mummichog and silversides returned (USGS 1999). We are planning a second year of monitoring. These results suggest a direct, positive impact on the wetlands in the project area.

We would also continue coordination with the Corps of Engineers, who have initiated a feasibility study to restore saltwater flow to an additional 25 acres of former saltmarsh, also dominated by Phragmites. No specific recommendations are known at this time. However, the overall objective to restore tidal flow and reduce Phragmites is similar to the 1998 project.

Alternative A would also continue cooperation with the Environmental Protection Agency (EPA), or their delegated authority, to resolve the CERCLIS site clean-up at the former Town of Middletown land fill. The current plan is to remove approximately 3 acres of fill in former wetlands dominated by Phragmites. We expect EPA to release a detailed project plan by March 2000 for public review. While short-term impacts on adjacent wetlands may occur during restoration work, this project would directly improve the condition of wetlands, soils, and hydrology over the long term.

In a separate effort to control purple loosestrife, another invasive plant that invades moist soils, approximately 6,000 exotic *Galerucella* beetles were released as a biological control agent in 1998. We would continue to monitor this project to determine if the beetles are effective in reducing the density and reproductive success of purple loosestrife. Since its release in the United States in 1992, there have been no reports of *Galerucella* feeding on native plants. Monitoring will determine whether the project is successful in eliminating purple loosestrife from the areas and restoring native plant diversity, and more beetles would be released if needed.

Alternative B (The Proposed Action)

The impacts noted for upland soils in Alternative A, above would be the same, except another 40 acres of predominantly invasive shrub land would be managed to promote an early successional shrub or grassland habitat. Treatment methods would be the same as proposed above, under the same conditions. No long-term, adverse impacts would be expected to soils.

Alternative B would add to the acres of restored wetlands, with the expectation that the Corps of Engineers' recommendation would be designed and implemented (see Alternative A). With the combination of the Corps project, the CERCLIS site clean-up, and the 1998 saltmarsh project, virtually all of the saltmarsh habitat on the Refuge would be included in a restoration project. While restoration work may have short-term impacts on wetlands, these projects would directly improve wetlands habitat over the long term.

Alternative C

Same as Alternative B.

Alternative D

Alternative D proposes the same wetlands restoration project as Alternative A, except that we would use only biological or mechanical treatments, in response to public concerns about the use of chemicals in the environment and the potential impacts of fire on air quality and human health. However, precluding use of Federally approved herbicides and prescribed fires would severely hamper the ability of Refuge staff to control invasive plants. Both of these treatment methods have been used on Sachuest Point Refuge at various times to reduce invasive plants and to establish and maintain successful habitat areas in a cost-effective or timely way.

Invasive plants have become incredibly pervasive on the Refuge, dominating 40 percent of Refuge habitats. Their aggressive and resilient nature requires frequent, thorough treatments. With only mechanical and biological treatments available, Refuge staff would not be able to effectively control these species. Labor intensity/acre is much greater with mechanical treatments compared to prescribed fire and herbicides. Limitations in equipment would restrict access to some areas that could only be reached with fire or chemicals. In particular, access to invasive wetlands plants can be difficult, and limit mechanical treatments. The success of wetlands restoration over the long term would be compromised without the use of all treatment methods available, as would the ability to manage all the acres proposed within the given time frames.

Summary

Alternatives B and C equally would provide the greatest benefit to wetlands and hydrology over both the short and long terms, and best meet the intent of Goal 2 for Sachuest Point Refuge. Alternative A would not restore as many acres of wetlands. Alternative D would restore fewer acres than Alternative A without the use of prescribed fire or herbicides. All of the alternatives would comply with the Clean Water Act.

Biological Resources – Vegetation

Alternative A (Current Management)

The dominance of invasive plant species, particularly Asian bittersweet, has severely degraded the habitat value of uplands on the Refuge. Forty percent of the plant species on the Refuge are invasive, exotic species covering 80 percent of its uplands. Alternative A would continue current management to treat approximately 42 acres of uplands to maintain early successional, native shrub land and grassland habitats. As described in the soils discussion above, treatment methods have included mowing, brush hogging, hydroaxing, prescribed fire, and chemical treatments.

It is important to note that while Sachuest Point Refuge was a military installation, much of the upland was maintained as early successional shrub land and grassland. Over the last 25 years, much of the upland has converted to older, mature shrub land, except in a few small mowed areas around the building and along trails. As you would expect, the change in habitat has brought a change in the bird community. Over the last 5 years of monitoring breeding birds, the Refuge has noted an increase in landbirds that prefer shrub habitat. Species such as the gray catbird, northern oriole, brown thrasher, rufous-sided towhee, and American redstart, have all been increasing (Flores 1997).

Current vegetative treatments are designed to accomplish two objectives: (1) create or maintain early successional habitat, ideally native grasslands, which are in severe decline in New England; and (2) control invasive plant species. Our Connecticut River/Long Island Sound Ecosystem Team identified both of these objectives as priority actions.

The success of treatments has been mixed for a variety of reasons. Past experience has shown that mechanical treatments, especially in shrub lands, are most effective at reducing vegetation when used in combination with prescribed fire or chemical treatments, both of which help eliminate vegetative litter. The projects on the Refuge have not had ideal conditions for conducting combined treatments in a timely manner. We attempted to use prescribed fire under weather conditions that were too cool and wet to be effective. Further, the ability of the Refuge staff to purchase and apply herbicides is limited. Monitoring in the project area continues to help evaluate the best possible combination of treatments.

No Federal- or State-listed plant species are known on the Refuge. The Refuge is, however, a historic site for sea beach amaranth, a Federal-listed threatened species.

Alternative B (The Proposed Action)

Alternative B would create or maintain a total of 82 acres in early successional shrub land or grassland habitat on the Refuge. We would not expect to eliminate shrub habitat with the proposed treatments, but would maintain them in a younger, lower growing, non-berry-producing stage of growth in order to promote habitat for early successional species. The remaining unmanaged uplands exist as shrub land with approximately 1 acre of trees mixed in.

Overall, Alternative B proposes to alter 82 acres of older, mature shrub habitat, converting it to either grasslands or an early successional shrub stage. The remaining unmanaged uplands, consisting mostly of mature shrub habitat, would be modified only by invasive plant treatments. This would reduce the availability of mature shrubs for some wildlife species, but not enough to risk the viability of any species present, and no Federal-listed species would be impacted. Any impacts would be offset by the ecological benefits of increasing the amount of early successional habitat, which has been in severe decline throughout New England.

Alternative C

Same as Alternative B.

Alternative D

Same as Alternative A, except herbicides or burning would not be used as management tools for maintaining early successional habitat. Eliminating these tools would greatly hamper success, and would force us to rely exclusively on less cost-effective strategies. Using only biological and mechanical treatments would jeopardize our ability to sustain quality early successional habitat over the long term.

Summary

Alternatives B and C equally provide the greatest benefit to vegetation and best meet the intent of Goal 2 for Sachuest Point Refuge. Alternative A would not restore grasslands or treat invasive plants to the level proposed in Alternatives B and C. Alternative D would provide even less certainty of restoring grassland habitats over the long term without the use of herbicides and prescribed fire.

Biological Resources – Threatened and Endangered Species and other Species of Management Concern

Alternative A (Current Management)

No Federal- or State-listed threatened or endangered wildlife species breed on Sachuest Point Refuge. No Federal-listed plants are now known on the Refuge.

Occasionally, Federal-listed species such as the bald eagle pass through during migration. The harlequin duck, which was proposed for Federal listing, winters each year just off the Refuge shoreline in numbers up to 107. That winter population is the second highest documented off the U.S. Atlantic coast. Only a population off the coast of Maine generally has higher numbers. These harlequin ducks are a major attraction for bird watchers who come from throughout New England to observe them. Peregrine falcon, which were recently delisted, also pass through the Refuge during migration.

The current grassland management and invasive plant control program on 40 acres may be directly impacting shrub dependent birds such as the brown thrasher, northern oriole, gray catbird and American redstart. These birds rely on shrubs for nesting and foraging. Many other birds rely on the berries produced by shrubs during migration. Besides birds, small mammals such as eastern cottontail use the dense shrub land for shelter and dens. These species would be displaced by the habitat work. However, the remaining 120 acres of unmanaged upland on the Refuge is shrub habitat and shrub lands are prevalent in the landscape adjacent to the Refuge. We do not predict a threat to the viability of any of these species' populations on Aquidneck Island over the short or long term. None of these shrub dependent species are Federal- or State-listed as threatened or endangered. Further, the proposed vegetative treatments would create or maintain a habitat type that supports a species assemblage that is drastically declining in New England (Vickery 1997), as described previously for Ninigret Refuge.

Species associated with early successional habitat would be positively impacted with the proposed restoration work. A primary objective of the project would be to create habitat to support breeding grasshopper sparrows, a State-listed species which are suspected to have nested historically in the area. Raptors would directly benefit as well, such as the State-listed northern harrier, and short-eared owls, which migrate through and winter on the Refuge. Vegetative treatments would also reduce the dominance of invasive plant species, a priority action for the Ecosystem team.

No formal surveys have been conducted for amphibians and reptiles. Casual observations have noted common species of snakes and frogs, but no salamanders or turtles have been documented. We predict amphibians and reptiles would be displaced during restoration work, but would benefit over the long term with improved habitat conditions.

With no Federal- or State-listed species occurring on the Refuge, no direct impacts are predicted under Alternative A. Over the long term, the early successional upland habitat project on 42 acres may provide habitat for State-listed species such as the northern harrier and grasshopper sparrow.

Alternative B (Proposed Action)

The impacts from implementing Alternative B is similar to Alternative A except that the additional 40 acres (82 acres total) of early successional habitat work would increase the likelihood of attracting State-listed grassland bird species such as the grasshopper sparrow, the upland sandpiper, and the northern harrier. The increased habitat work would also work towards further reducing invasive plants.

In addition, Alternative B proposes that Refuge staff work with partners to identify, map, and monitor shorebird concentration areas. We consider Sachuest Point Refuge a shorebird concentration area during migration, but it has not been sufficiently monitored and compared with other sites along the New England coast. Alternative B would increase the Refuge information base, indirectly improving management for shorebirds on Refuge lands.

Alternative B proposes working with RI DEM to issue new hunting regulations that would restrict seaduck hunting from the intertidal area on Sachuest Point. While hunting harlequin duck is already restricted and Refuge lands are closed to all hunting; hunters access the intertidal shoreline which lies outside of the jurisdiction of the Service, to hunt eiders and other legal seaducks. This new regulation would reduce conflicts with Refuge visitors engaged in viewing the harlequin ducks and allow us to continue to promote Sachuest Point as a Watchable Wildlife Viewing Area. Refuge staff would increase monitoring of harlequin duck activities off Sachuest Point to evaluate whether increased numbers of wildlife observers affect their behavior.

Alternative B would implement inventories for landbirds of management concern, and for amphibians and reptiles on Sachuest Point Refuge. Following publication of a final Partners in Flight Landbird Plan for this region and a final Partnership for Amphibians and Reptiles Conservation Plan, we would complete Refuge-specific habitat management plans. These actions would provide direct, long-term benefits to landbirds, amphibians and reptiles on the Refuge.

The current trail system would be evaluated for redundancy and possibly reduced under Alternative B. Approximately three-quarters of a mile of redundant trail may be closed to public use and maintained as either native shrub land or grassland. Direct impacts from human disturbance would be reduced, thus directly benefitting wildlife susceptible to these impacts.

Alternative C

The impacts identified for Alternative B are the same with the exception of harlequin duck. Alternative C proposes to work with RIDEM to implement a “no hunting” zone in open water off the eastern shore of Sachuest Point to reduce the potential for disturbance to the local population of wintering harlequin duck. As stated under Alternative B, there is no hunting season for harlequin duck, but they are often found in rafts with other sea ducks, such as common eider, which are hunted. Incidental harvest of harlequin duck is extremely rare in Rhode Island; we know of only one confirmed over the last decade. However, harlequin duck are disturbed when eiders in the area are hunted, causing them to scatter and disperse.

No studies have been conducted to quantify the extent or frequency of that disturbance, so we are unable to describe the full beneficial impact on harlequin duck that would be expected from a hunting closure. Implementing this action is subject to the approval by the State of Rhode Island as the Service has no jurisdiction over open water. Similar to Alternative B, we would actively promote Sachuest Point Refuge as a Watchable Wildlife Area for harlequin duck viewing and use the opportunity to promote stewardship of our natural resources.

Alternative D

Same as Alternative A.

Summary

Alternatives B and C equally provide the greatest benefit to species of management concern over the long term; these alternatives best meet the intent of Goal 1 on Sachuest Point Refuge. Alternatives A and D maintain the status quo and the impacts are neutral. Section 7 consultation, to ensure compliance with the Endangered Species Act, would be undertaken upon release of this draft CCP/EA.

Cultural Resources*Alternative A (Current Management)*

No archeological sites have been recorded on Sachuest Point Refuge, although two sites have been submitted to the State Historic Preservation Officer for designation. No comprehensive surveys have been conducted on the Refuge, and none are proposed under Alternative A. No management actions are proposed that would adversely impact the integrity of known sites. Immediate project areas would be surveyed to ensure compliance with Section 106 of the National Historic Preservation Act.

Alternative A proposes no management actions that would enhance our knowledge of cultural resources or improve management on Sachuest Point Refuge. We predict neutral impacts on cultural resources over the short and long terms.

Alternative B (The Proposed Action)

Alternative B proposes a cultural resources overview of the Refuge Complex and training more Refuge staff in Archeological Resource Protection Act enforcement. We would also develop a partnership agreement with the Narragansett Indian Tribal Council. These actions would indirectly benefit cultural resources, over both the short and long terms, by increasing information available to Refuge staff, and improving protection of significant sites. As with the other alternatives, we would survey all future ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act.

Alternative C

The impacts noted for Alternative B would be the same under Alternative C. The only difference is that Alternative C would initiate a field investigation on the Refuge to further increase information available to Refuge staff and ensure protection of cultural resources. In addition, these resources would indirectly benefit through development of environmental education and interpretive programs for local use.

Alternative D

Impacts from implementing Alternative D are the same as Alternative A, except for positive impacts resulting from a partnership agreement with the Narragansett Indian Tribal Council. That agreement would increase our understanding of Native American use and history of the area.

Summary

Alternative C provides the greatest positive, indirect and direct impacts on cultural resources over the long term, followed by Alternatives B, then D; Alternative A would provide the least benefit to cultural resources on Sachuest Point Refuge. All alternatives would comply with the Archeological Resources Protection Act. A Section 106 review, to ensure compliance with the National Historic Preservation Act, will be undertaken with release of this draft CCP/EA.

Public Use

Alternative A (Current Management)

Although we expect a 10-percent increase in the amount of visitor use across the Refuge Complex, there would not be any changes in public use programs. Fishing would continue from the shoreline; hunting would not be allowed. Current levels of environmental education and interpretation, and wildlife observation and photography would also continue. The Sachuest Point Visitor Center facility and interpretive exhibits would be upgraded as funding becomes available. No additional Refuge staff or funds would be provided to assist in public use or visitor services.



Interpretation. *Information kiosks provide the public with basic information about a refuge. USFWS photo*

We predict an increase in the level of non-wildlife-dependent uses, roughly corresponding with the 10-percent increase in overall visitation on the Refuge Complex. The most prevalent, recurring non-wildlife-dependent uses at Sachuest Point are dog walking, jogging, swimming and sunbathing. Additional non-wildlife-dependent uses documented on Sachuest Point Refuge include bicycle trail riding, horseback riding, kite flying, berry picking, fireworks, and bonfires. Staff shortages have limited our ability to effectively address these activities. Alternative A would not increase our law enforcement capability. With continued, limited enforcement, we predict a negative impact on priority public uses, due to conflicts with non-wildlife-dependent public uses.

Alternative B (The Proposed Action)

In addition to current activities, Alternative B would develop a Refuge Complex Visitor Services Plan to address program needs and opportunities, identify target audiences, define threshold limits on impacts on wildlife and habitats, and determine how to evaluate success. We would also establish formal partnerships to address visitor service planning and funding.

Public hunting would continue not to be allowed on Refuge land under Alternative B. In addition, we would request that RI DEM change hunting regulations to preclude shoreline hunting in the intertidal area on Sachuest Point. The purpose of this action is to reduce user conflicts between shoreline hunters and wildlife observers at Sachuest Point Refuge. Refuge visitors travel from all over New England to view the harlequin ducks on Sachuest Point. Many birders express their dismay at traveling to the Refuge to observe harlequin ducks disturbed and scattered by hunters shooting at the eiders. In combination with the hunting closure area, Sachuest Point Refuge would be promoted as a Watchable Wildlife Viewing Area. These actions would directly benefit visitors engaged in wildlife observation. On the other hand, a hunting closure would negatively impact the hunting public, exacerbating a decline in hunting opportunities that is occurring throughout Rhode Island. Increased residential shoreline development has had a major impact on waterfowl hunting opportunities.

Alternative B would slightly modify current shoreline fishing opportunities on Sachuest Point Refuge. Designated pedestrian access points would be established from the main trail down to the shoreline rocks, in order to reduce shoreline bank erosion and trampling of vegetation from angler foot traffic. Despite the designated access points, virtually all of the fishing spots on the shoreline rocks would still be accessible. We would continue to allow night fishing, and develop a regulation requiring spear fishing gear be unloaded and encased while on Refuge lands. These actions would combine to ensure compliance with Service policy, reduce safety hazards and intimidation of other users, and protect shoreline habitats. Overall, a direct, positive impact on the quality of fishing opportunities on Sachuest Point Refuge would result.

Alternative B proposes expanding the environmental education opportunities at Sachuest Point Refuge by developing a formal partnership with the Norman Bird Sanctuary to facilitate sharing of educational resources. Additionally, curriculum based environmental education programs would be developed for the Newport and Middletown school systems, and a volunteer environmental education corps would be established to implement programs. The combination of the proposed actions would result in a direct, positive impact on environmental education opportunities at Sachuest Point Refuge.

Alternative B proposes to develop and fund an interpretive plan to address the need for interpretive pamphlets and interpretive displays along trails. We would develop an interpretive trail to describe the natural and cultural history of the Refuge, and interpretive exhibits for Second Beach, Third Beach, and the Newport Visitor Center. This would greatly expand the opportunities for environmental interpretation and would provide Refuge staff with the ability to reach hundreds of thousands of people with an environmental stewardship message.

Under Alternative B, we would evaluate for elimination approximately three-quarters of a mile of redundant trail in the central portion of the uplands. This may inconvenience some visitors, but we do not expect significant public concern from visitors engaged in priority public use activities, since all the destination points on Sachuest Point Refuge would still be accessible. We would also construct a barrier-free trail, with one or more accessible observation platforms, and develop watchable wildlife literature and a self-guided wildlife interpretive pamphlets. These actions would combine to greatly enhance the quality and diversity of experience for Refuge visitors.

On newly acquired lands, we would allow priority wildlife-dependent public use to continue on an interim basis unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Alternative B would eliminate all non-wildlife-dependent public use by 2005, including dog walking, jogging, swimming and sunbathing, bicycling, horseback riding, and bonfires. None of these activities support a priority public use; they are not required to meet the goals for the Refuge, nor are they compatible with the purposes for which the Refuge was established.

Eliminating the two most prevalent of these activities, dog walking and jogging, would cause the greatest public reaction. Outreach and education to eliminate these particular activities would begin immediately, with the availability of Refuge staff and resources. These two activities are well established on the Refuge and many people come to the Refuge solely to engage in them.

Dog walking is one of the most disturbing activities, to wildlife and visitors alike, occurring on Sachuest Point Refuge. Volunteers continually observe dog walkers on the Refuge allowing their dogs to run free and chase wildlife. Volunteers also consistently observe dogs leaving feces on Refuge trails. Dog feces carry pathogens that can introduce diseases to Refuge wildlife; they also detract from a pleasant, wildlife-oriented experience. Further, many Refuge visitors do not like to be confronted by a dog while walking on trails, and are frustrated when dogs disturb their wildlife observation and photography opportunities.

Several towns in Rhode Island, including the Town of Middletown, have recently enacted regulations prohibiting dogs from town-owned public places for the reasons cited above. Unfortunately, these town restrictions have resulted in increased dog walking on Sachuest Point Refuge. Eliminating dog walking would have a negative impact on many current Refuge visitors, but would tremendously improve the quality of experience for Refuge visitors engaged in wildlife-dependent activities, and would also benefit the wildlife that dogs disturb.

Jogging is another non-wildlife-dependent recreational use at Sachuest Point that disturbs wildlife and those visitors attempting to observe or photograph them. Jogging is extremely popular on Sachuest Point trails; the Refuge is a specific destination for many joggers. Conflicts between wildlife-dependent Refuge visitors and joggers would increase without enforcement, since we expect visitation to increase. We predict strong opposition from the local jogging community to closing the Refuge to this activity. However, while eliminating jogging on Refuge trails would adversely impact joggers, it would directly benefit visitors engaged in priority wildlife-dependent activities.

Because of the present level of non-wildlife-dependent use, effective implementation of Alternative B would require permanent staff assigned to Sachuest Point Refuge to provide consistent resource protection, outreach and enforcement of Refuge regulations. This would result in a positive benefit to the priority, wildlife-dependent users at Sachuest Point Refuge.

Alternative C

Alternative C proposes to reduce the overall level of public use on Sachuest Point Refuge in order to minimize impacts on wildlife and habitat. We would, however, emphasize environmental interpretation and education, in the hope of making Refuge visitors better stewards of wildlife and habitat.

We would request that RI DEM establish a “no hunting” zone in open water off the eastern point of Sachuest Point. Present seaduck hunting is occurring by boat. The purpose of this action is to minimize disturbance to wintering harlequin ducks, and reduce user conflicts between hunters off-shore and wildlife observers at Sachuest Point Refuge. Although Federal regulations protect harlequin ducks from hunting, they tend to feed and rest in rafts with common eider, who are hunted off Sachuest Point.

Refuge visitors travel from all over New England to view the harlequin ducks on Sachuest Point. Many birders express their dismay at traveling to the Refuge to observe harlequin ducks disturbed and scattered by hunters shooting at the eiders. In combination with the hunting closure area, Sachuest Point Refuge would be promoted as a Watchable Wildlife Viewing Area. These actions would directly benefit visitors engaged in wildlife observation.

On the other hand, a hunting closure would negatively impact the hunting public, exacerbating a decline in hunting opportunities that is occurring throughout Rhode Island. Increased residential shoreline development has had a major impact on waterfowl hunting opportunities.

Alternative C would close the Refuge shoreline to night surf fishing. This action would help eliminate the current law enforcement problems associated with bonfires and parties after dark. Also, this proposal would eliminate any possible impacts on wildlife associated with the bright lights used by anglers. These impacts have never been monitored, and we only presume they alter the nocturnal behavior of some wildlife. Night surf fishing is an extremely popular activity. We expect much opposition from the angling public to this proposal.

Similar to Alternative B, Alternative C proposes to enhance environmental education opportunities at Sachuest Point by developing a formal partnership with Norman Bird Sanctuary. This would allow Refuge staff to share in developing and implementing a curriculum and to better use the Sachuest Point Visitor facility. These actions would result in a direct, positive impact on environmental education opportunities at Sachuest Point Refuge. Environmental interpretation would also be improved, through renovation of the Sachuest Point Visitor Center's interpretive exhibits and construction of interpretive kiosks describing wetland and grassland restoration to the visiting public.

Wildlife observation and photography would be impacted slightly by reducing approximately three-quarters of a mile of redundant interior trail. Some visitors would be inconvenienced, but we would still provide access to all the various habitat types present and to all the destination points on the Refuge. On the other hand, eliminating an interior trail would reduce disturbance to wildlife, and provide a larger patch of contiguous habitat.

Alternative C proposes the most aggressive schedule for eliminating inappropriate and non-wildlife-dependent use (by 2002) at Sachuest Point Refuge and proposes hiring a law enforcement officer to assure compliance with the changes in public use. There is no doubt this proposal would result in a high level of public concern about restrictions on the Refuge.

Alternative D

Alternative D would maintain or enhance priority public use opportunities within the legal framework and compatibility mandates of Sachuest Point Refuge. Similar to Alternative A, we would continue to prohibit hunting on the Refuge, but we would not pursue a sea duck hunting closure off Sachuest Point. Refuge visitors who come to view the wintering harlequin ducks would continue to be impacted by sea duck hunting on State waters. However, the hunting public would continue to enjoy an opportunity that is in decline in Rhode Island.

We would establish a regulation to require spear fishing gear to be unloaded and encased. We would also construct a barrier-free fishing platform by 2005, if it is technically and economically feasible. No other changes to fishing would occur. Overall, the impacts on anglers would be negligible, or slightly positive, with the introduction of barrier-free accessibility.

Opportunities for environmental education, environmental interpretation, wildlife observation, and photography are the same as proposed in Alternative B. These actions would greatly enhance public use opportunities, resulting in a positive impact on public use.

Alternative D would eliminate current non-wildlife-dependent uses by 2005, similar to Alternative B. This would negatively impact some users, but would also enhance opportunities for priority, wildlife-dependent uses.

Summary

Alternative D would provide the greatest positive impact on priority public uses, with increases in most program areas. However, that emphasis would result in a greater potential disturbance to wildlife and habitats. The extent of risk is not known, but monitoring and evaluation would be an important part of implementation. Alternative B would result in increased opportunities for priority public use, but would continue to implement wildlife and habitat projects as a higher priority. Alternative C would provide the fewest benefits to public use, focusing almost exclusively on wildlife and habitat projects. Alternative A would not change current public use opportunities; it would have negligible impacts on current uses. Alternative B provides the best balance in meeting Goals 1 and 4 by increasing opportunities at minimal risk to wildlife and habitat values.

All the alternatives would allow priority, wildlife-dependent public use to continue on an interim basis on newly acquired lands, unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Trustom Pond Refuge

Physical Resources – Soils, Hydrology, and Wetlands

Alternative A (Current Management)

Similar to the other Refuges, historical land use practices at Trustom Pond Refuge, namely agriculture, have significantly affected soils, hydrology, and wetlands. Most of the uplands were grazed by sheep during the late 1800's and early 1900's or were intensively managed croplands. Just before our acquisition, approximately 55 acres of Refuge land were actively hayed and another 90 acres were managed in corn and potatoes. These fields were maintained intensively through plowing, discing, fertilizing, and chemical treatments.

Approximately 125 acres of former agriculture fields are planned for or actively managed as native, early successional coastal sandplain habitat. Another 20 acres of former agricultural field are in ryegrass, cooperatively managed with RI DEM for an annual Canada goose hunt. The Refuge is cooperating with an adjacent family farm to manage an additional 40 acres of coastal sandplain grassland. No additional grassland restoration is proposed under Alternative A.

Refuge staff established native, early successional coastal sandplain grasslands by discing, plowing, harrowing, rolling, fertilizing, and seeding. Future maintenance of these fields under Alternative A would involve mowing, prescribed fire, and chemical treatments for invasive plant species. No heavy equipment would travel on wetlands or hydric soils. Prescribed fire treatments would follow the stipulations required in the Fire Management Plan (1995). Chemical treatments would be approved annually by the Regional Contaminants Specialist, who ensures all Federal requirements for the type of herbicide and application rate are met. While historical land use practices and the current maintenance of native, coastal sandplain grasslands have undoubtedly affected soils, there have been no indications of soil compaction, soil loss, or loss of soil productivity on current Refuge lands, nor do we predict that proposed management actions would negatively impact soils over the long term. Phragmites eradication on 5 acres of wetland, using chemical, mechanical, and prescribed burning, has been the only habitat management on the Refuge's 70 acres of wetland.

For the past five spring seasons, we have mechanically breached Trustom Pond using a backhoe, typically in April. We typically breach Cards Pond 8 to 10 times a year, when landowners become concerned about high water backing into their septic and well systems, or when high water threatens roads and agricultural fields.

We would continue to breach the ponds as described above. The objectives of spring breaching Trustom Pond are:

- Provide increased foraging opportunities in the mudflats for shorebirds, including piping plover;
- Expose an island for common tern nesting;
- Introduce saltwater back into the aquatic system;
- Increase production of submerged aquatic vegetation (SAV), a principle food source for wintering waterfowl;
- Maintain the current invertebrate and finfish populations; and
- Help to alleviate summer eutrophic conditions (see Chapter 2, *Affected Environment*).

Although not quantified, we also expect the breaching to benefit alewife, an anadromous fish and Federal trust resource.

The draft Trustom Pond Master Plan describes the following impacts from spring breaching of Trustom Pond:

“Spring breaching temporarily exposes 120 acres of mudflats. The water level rises through the summer, resuming its pre-breaching area of 160 acres by mid-summer. Salinity rises sharply immediately after breaching, decreasing slowly as the pond refills, until it reaches its pre-breaching low of 4 to 5 parts per thousand by early autumn. With the influx of cold water, the temperature of the pond decreases 4 to 5C at the breachway and 2 to 3C at the north end of the pond. Dissolved oxygen content of the water increases with the decrease in water temperature, then decreases when the pond warms later in the summer. Nitrogen and phosphorus decrease with the influx of sea water after breaching, but each replenishes as the pond refills. Algae is flushed from the pond after breaching, but increases along with the increases in nitrogen and phosphorus as the pond refills. The decrease in algae growth increases light penetration, and benefits the production of SAVs like sago pondweed (*Potamogeton pectinatus*) and widgeon grass (*Ruppia maritima*)” (USFWS 1987).

Summer breaching may better alleviate eutrophic conditions and reduce bacterial contamination, but has not been practiced at Trustom Pond because of concerns about public safety, impacts on public beach use, and management for piping plover (CRMC 1998). Summer breaching may also adversely impact SAV growth at its summer peak. Breaching the pond in the spring, rather than summer, may have adverse water quality consequences, but also alleviates some of the concerns listed above.

Overall, Alternative A would impact soils from the grasslands restoration projects proposed, but the impacts would be limited in duration and intensity and should not reduce soil productivity over the long term. We would continue to breach Trustom Pond once a year, benefitting shorebirds and other animals that use exposed mudflats. We expect that breaching would also benefit most of the saltwater-dependent native fish in Trustom Pond. Very little information is available about the impacts on other aquatic resources like invertebrates and plant life, since they are not easily monitored.

Alternative B (The Proposed Action)

The impacts on soils, hydrology, and wetlands described for Alternative A are similar to Alternative B because the same coastal sandplain habitat projects would continue. The same 125 acres of grassland restoration work on the Refuge is proposed in Alternative B. No work is planned that would directly or indirectly affect the smaller freshwater ponds or emergent wetlands.

In addition to Alternative A, we would initiate strategic planning to improve the water quality and habitat conditions in Trustom Pond and Cards Pond. We would work with partners and local experts to develop and implement an integrated management plan establishing a desired future condition. The plan would determine the best short- and long-term actions needed to maintain ecological integrity and to manage for species of highest concern, with due consideration given to piping plover and other shorebirds, wintering waterfowl, anadromous fish, rare plants, and the other desirable aquatic resources.

The integrated management plan would explore the location and timing for increased breaching of Trustom Pond. Breaching at different times of year and different locations is often suggested as a means of improving habitat for shorebirds and waterfowl and as a solution for improving water quality. Some experts disagree, however, and suggest that more information is needed on the cumulative impacts of breaching in what are now highly impacted aquatic systems. For example, the Special Area Management Plan for Coastal Salt Ponds states, "Although it is a popular belief that greater water exchange between the lagoons and the ocean will enhance water quality... increased flushing can have many undesirable effects on the ecology and use of the ponds" (Olsen and Lee 1982). The dramatic changes to salinity, water temperature, and amount of exposed mud flats could be affecting invertebrates or other aquatic resources, not easily monitored, with unknown consequences.

The cooperative, integrated plan proposed in Alternative B would bring together varied expert opinions on whether these concerns apply to Trustom Pond and Cards Pond, and whether there is any agreement on actions that should be pursued. The integrated planning proposed for Alternative B would indirectly benefit management and protection of the ponds over the short term through increased technical information exchange. With implementation of the integrated plan, we predict direct benefits to the aquatic resources in the ponds over the long term.

Alternative C

Same as Alternative B, except Alternative C proposes to develop a coalition of partners to initiate watershed planning and protection throughout the entire Trustom Pond and Cards Pond watersheds. That partnership, yet to be organized, was recommended in the Special Area Management Plan for the Salt Pond Region (CRMC 1998). Through outreach and education, this additional action would provide additional, indirect benefits to aquatic resources in the Trustom Pond and Cards Pond watersheds.

Alternative D

Same as Alternative A, except no herbicides or prescribed fire would be used for habitat work. This proposal responds to people who believe these activities threaten human health and safety. Without herbicides or use of prescribed fire, our ability to control invasive wetland plants would be greatly hampered. Invasive plants are well established on the Refuge, and their hardiness and resilience pose a significant challenge to controlling them. Mechanical treatments are very labor-intensive and expensive, especially in aquatic ecosystems, and often are ineffective because much of the plant is underground. We would be able to treat fewer acres, even while maintaining current personnel and funding levels. In effect, our ability to control the spread of invasive wetlands plants would be jeopardized without the use of all reasonable treatment methods available, including herbicides and prescribed fire.

Summary

Alternative C slightly exceeds Alternative B in providing the greatest long-term benefits to wetlands and watershed protection. These two alternatives best meet Goals 1 and 2 related to species of concern and natural ecological communities. Alternative A follows with must less improvement to wetlands, and Alternative D provides the least potential benefit.

Biological Resources–Vegetation*Alternative A (Current Management)*

Alternative A primarily affects vegetation through maintaining grasslands and early successional shrub habitat. We would continue restoration and maintenance of the 125 acres of native coastal sandplain grasslands or early successional shrub lands as described above in the “Soils” discussion. We would continue to brush-hog an additional 11 acres of “old field” or upland shrub habitat approximately every 2 years. These actions support the Connecticut River/Long Island Sound Ecoteam priority goal of creating and maintaining native coastal sandplain communities. We would continue to maintain the 20 acres of upland field open to migratory bird hunting in non-native grasses, according to the plan developed by RI DEM (1999). We predict negligible impacts on vegetative structure in restored areas from continued maintenance of the 125 acres. Species composition and overall biological diversity, however, would improve on these treated areas as we restore them from non-native species to a native, early successional coastal sandplain grassland community. The proposed treatments would not eliminate any shrub species; rather, we would maintain species in an earlier successional stage than their present one.

Restoration techniques would include discing, plowing, harrowing, rolling, fertilizing, and seeding. Future maintenance of these fields under Alternative A would involve mowing, prescribed fire, and chemical treatments for invasive plant species. No heavy equipment would travel on wetlands or hydric soils. Prescribed fire treatments would follow the stipulations required in the Fire Management Plan (1995). Chemical treatments would be approved annually by the Regional Contaminants Specialist, who upholds Federal guidelines on pesticides and application rates. Following these stipulations and Federal regulations associated with chemical and prescribed fire treatments, we predict negligible adverse environmental impacts.

We would also continue limited treatment of invasive plants, primarily through chemical, prescribed fire, and mechanical treatments, as funding and staff levels allow. Loss of shallow wetlands to Phragmites would continue to negatively impact habitat for black duck, a focus species, and other dabbling ducks that frequent Trustom Pond.

We know of several sites on the Refuge with populations of unique and rare plants, and suspect others. No management actions are proposed to benefit these sites.

Alternative B (The Proposed Action)

This alternative proposes the same grassland and shrub restoration projects as Alternative A. However, we would increase control measures for invasive plant species to treat at least 25 acres/year, using mechanical, biological, chemical, and prescribed fire as needed across the Refuge Complex. Trustom Pond Refuge would be a priority area for treatment, especially the Phragmites along the edge of both Trustom Pond and Cards Pond.

Impacts on upland vegetation would be positive, similar to Alternative A, because the projects are designed to convert existing non-native habitat to a native coastal sandplain community type. We would also develop an inventory, management, and monitoring plan for the rare plant sites on the Refuge. Plans would be cooperatively developed using expertise from RI DEM, University of Rhode Island, The Nature Conservancy, and State botanical organizations. This action would directly benefit these rare plant sites over the short and long terms.

Alternative C

Alternative C would result in the same impacts on vegetation described for Alternative B, with the exception of the 20-acre upland field cooperatively managed with RI DEM. Alternative C would close that field to hunting and convert it from non-native grasses to a native, early successional coastal sandplain community type. This action would best implement the Connecticut River/Long Island Sound Ecoteam goal of increasing native coastal sandplain grasslands.

Alternative D

Actions proposed are the same as Alternative A, except that the use of herbicides and prescribed fire would not occur. We estimate that at least 30 percent fewer acres would effectively be restored and maintained in native habitats without the use of these tools (see previous discussion under “Physical Resources, Alternative D”).

Summary

Alternative C would best meet Goal 2 for Trustom Pond and Connecticut River/Long Island Sound Ecosystem Team priorities, through maintenance of native, early successional coastal sandplain habitats, increased invasive plant control, and inventory, management, and monitoring of rare plant sites. Alternative B would restore 20 acres less of native grassland, but is otherwise identical to Alternative C. Alternative A would rank third, and Alternative D would do the least to control invasive plants, restore native plant communities, and manage rare plant sites.

Biological Resources—Threatened and Endangered Species and Other Species of Management Concern*Alternative A (Current Management)*

The only Federal-listed species known to breed on the Refuge is the threatened piping plover. Other species of concern on Trustom Pond Refuge that have been a management focus are discussed below, including black duck, grassland birds, shorebirds, amphibians and reptiles. The current monitoring programs for landbirds would continue, using established protocol to collect baseline information on species occurrence, productivity, and survival during the breeding season. Once completed, the Partners In Flight–Landbird Conservation Plan for Physiographic Area 9 (Southern New England) may identify additional management for certain species (Rosenberg 1999).

Piping plover management activities on Trustom Pond Refuge, both historic and current, are described in depth in Chapter 2. Chapter 2 also describes the involvement of Refuge staff in piping plover management along the entire South Shore of Rhode Island.

To put the Refuge-managed piping plover population into perspective, we offer the following. The estimated population of the Atlantic Coast piping plover in the New England Region for 1999 was 634 pairs; 39 pairs nested in the State of Rhode Island; 17 pairs were on South Shore beaches off the Refuge, and an additional 9 pairs were on Trustom Pond Refuge (Hecht 2000). While the Rhode Island nesting sites contributed only 6% of the population in 1999, they are geographically important for distributing nesting plovers in the New England Region. Rhode Island is situated halfway between two piping plover population centers; Cape Cod to the north and Long Island to the south. A well-distributed population is vital to full recovery.

Loss and degradation of habitat due to development and shoreline stabilization, disturbance by humans and pets, and predation are the principle factors cited by the Revised Recovery Plan as causing a decline in piping plover populations (USFWS 1996). All of these factors are relevant for Trustom Pond Refuge.

The Revised Recovery Plan also states, “The USFWS believes that top priority should be placed on maximizing productivity and abundance of plovers of Federal lands.” Intensive management on Refuge lands to protect breeding piping plovers was identified as a specific recovery task (USFWS 1996). All of the current piping plover management activities conducted by Refuge staff are specifically recommended by the Recovery Team to support recovery goals. However, despite the current level of intensive management on Trustom Pond Refuge, and some of the other South Shore beaches, recovery goals have not been met.

Chapter 2 presents figures for historic nesting on Trustom Pond Refuge and other South Shore beaches and annual productivity levels. Since 1989, nesting piping plover pairs on Trustom Pond Refuge have steadily increased from a low of 4 pairs in 1989 to a high of 11 pairs in 1998. Productivity was the highest it has been in over a decade, at 1.8 chicks fledged/pair in 1998. Despite a relatively high number of pairs nesting for the site (10 pairs) in 1999, the nesting productivity/pair at Trustom Pond Refuge was the lowest in 10 years at 0.5 chicks fledged/pair. Mammalian and avian predators were cited in the Trustom Pond Piping Plover Management Report (1999) as the number one factor limiting productivity. These inconsistent results occurred despite the same levels of management intensity. Predator populations are unpredictable, and exacerbate the complexity of managing for this species.

Alternative A would continue the current management strategies on Trustom Pond Refuge. These include the seasonal beach closure to all public use above the mean high tide line, predator control, nest fencing, and nest monitoring. We do not expect the number of piping plover nesting pairs to dramatically increase above the 11 pair high, since the estimated carrying capacity of the beach (based on physical attributes only) was determined to be 10 pairs (Hecht 1999). Our management objective is to increase the productivity of individual nest sites to meet the Recovery Plan goal of maintaining at least a 5-year average of 1.5 fledged/pair.

Alternative A also would continue Refuge staff involvement in the South Shore piping plover program in cooperation with the Friends Group. That involvement includes providing oversight, nest protection equipment, grant writing, and education and outreach materials to ensure adequate protection and management of all other South Shore piping plover breeding sites. These actions directly benefit piping plover nesting in Rhode Island.

Management for piping plover also benefits the State-listed threatened least tern, which also nests on the beach at Trustom Pond Refuge. Eighty-four pairs nested in 1999 along the overwash area adjacent to the breachway. This is the largest colony of least tern in Rhode Island. Only 5 to 10 chicks survived to fledging on Moonstone Beach, despite protective fencing, lethal and non-lethal predator control, and nest monitoring. Most of the loss was due to predation (Trustom Pond Least Tern Report 1999). Alternative A proposes to continue fencing and combined predator control techniques. Least tern productivity would remain unpredictable, and will depend on predator populations and the effectiveness of current control measures.

With regard to other species of concern, limited public access on Trustom Pond would continue to afford resting habitat to wintering black duck. Treating Phragmites along the pond fringes and mute swan control also improve habitat for black duck. No other management actions are directed specifically at benefitting black duck.

Many grassland birds and other grassland associated species would continue to directly benefit from the ongoing restoration and maintenance of 125 acres of early successional habitat. Those 125 acres comprise several fields of 40 acres or less. Opportunities for upland sandpiper and grasshopper sparrow, two species experiencing dramatic declines in the Northeast, may be limited, due to their requirement for fields larger than 75 acres. Other grassland and early successional bird species of concern using smaller fields, including eastern kingbird, bobolink, and meadowlark, would benefit.

While grassland birds would benefit, according to Biologists with RI DEM, the grasslands restoration work has adversely impacted resident and wintering waterfowl and created conflicts with adjacent landowners. When Refuge fields consisted of corn, waterfowl used to flock to the area. With the conversion to grasslands, these waterfowl have been displaced onto adjacent agricultural fields and turf farms on the South Shore and into Connecticut, where waterfowl nuisance complaints are on the rise.

Paton (1999) suggests that the freshwater ponds on Trustom Pond Refuge provide important habitat for amphibians. Large numbers of spotted salamanders, green frogs, pickerel frogs, and red spotted newts were identified. One of the largest populations in Rhode Island of four-toed salamanders was found on the Refuge. Alternative A would not directly impact any of the freshwater ponds. Reptiles and migrating amphibians may be impacted during habitat restoration as equipment works the fields. While some direct loss of individuals would occur, we do not predict the population would be impacted so that viability is jeopardized.

Continuing to acquire 358 acres within the current acquisition boundary, as proposed in Alternative A, would also indirectly benefit all species of concern by precluding additional development in watershed habitat.

Alternative B (The Proposed Action)

Alternative B would enhance current management by implementing measures to improve habitat quality for piping plover and least tern, black duck, and other species associated with Trustom Pond. In addition, Alternative B proposes that the Refuge hire a Rhode Island Piping Plover Coordinator to more effectively manage and coordinate protection at all plover sites along the South Shore. These sites account for 75 percent of the breeding piping plover population in Rhode Island.

Specifically, Alternative B would increase management of public use, education and outreach at piping plover and least tern nesting sites along the South Shore. Alternative B would also develop an Integrated Predator Management Plan, which would comprehensively review success of predator management strategies, promote outreach to adjacent landowners (who may inadvertently contribute to increased predator populations), evaluate lethal and non-lethal control techniques, and increase monitoring for predator activity at nest sites. Until the integrated plan has been completed, Alternative B would continue the current trapping program to control predators near piping plover and least tern nest sites on Refuges, in an attempt to directly increase nest productivity at individual sites. These measures would directly and indirectly benefit nesting piping plover and least tern over the short and long terms.

Alternative B would maintain the current public use seasonal beach restrictions at Moonstone Beach to protect nesting piping plover and least tern. Those restrictions have been in place for several years, and are generally recognized and accepted by the public. Only 20 citations were issued among the thousands of people that used this beach during the 1999 season.

Areas adjacent to Trustom Pond would be identified as a priority for increased invasive plant control work, especially for Phragmites. Reducing Phragmites would directly improve habitat for wintering black duck and other dabbling ducks who use the pond fringes and mudflats for foraging. It would also help reduce the exotic mute swans, which out-compete other waterfowl for food and space and adversely affect water quality.

Alternative B proposes to convene a group of local experts and partners to develop an integrated habitat management plan for Trustom Pond. The purpose of that plan and potential impacts are described above for Alternative B under the wetlands discussion.

The impacts described for grassland birds and waterfowl from the early successional habitat restoration would be the same as those described for Alternative A.

Amphibians and reptiles would indirectly benefit from early successional habitat restoration work designed to increase biological diversity. Indirect benefits would accrue as our integrated planning for Trustom Pond improves its water quality. Direct benefit would result from our proposal to identify migration corridors and implement actions to reduce road mortality. None of the smaller ponds or wetland habitats would be impacted, so existing habitat conditions would be maintained in these areas. We would continue to encourage and support research on amphibians and reptiles conducted through the University of Rhode Island.

Native mammal populations would also benefit from habitat restoration work and improvements to water quality. We would work with RI DEM, the Town of South Kingstown, and adjacent landowners to develop a deer management plan for the area including and surrounding the Refuge. We may recommend a deer hunt in the future, based on deer population objectives commensurate with habitat capability, or to address threats to human health and safety. Opening the Refuge to a new hunting opportunity would require a separate environmental assessment with specific actions, compatibility determination, public review and comment, and annual hunt plan before it would be implemented. Excessive browse on native vegetation, impacts on residential landscaping, increased concern about Lyme bearing ticks and vehicle-deer collisions are possible outcomes of not managing deer populations.

The acquisition of an additional 3,200 acres would indirectly benefit all species of concern. In general, by precluding development and managing public use, species would benefit.

Alternative C

Alternative C would implement the same actions as Alternative B, plus additional measures for piping plover and least tern recovery. We would modify seasonal beach closure to increase piping plover and least tern productivity, while also allowing for greater public access to Moonstone Beach at the beginning and end of each nesting season.

The basic assumption with the modified seasonal restriction is that the most critical time period in the life of a newly hatched piping plover chick is the period between hatching and fledging. Piping plover chicks leave the nest within hours of hatching to begin feeding on their own, primarily in the intertidal zone. Of particular concern are their first 12 days. Chicks that fail to double their weight by that age are least likely to survive, and most likely to succumb to predation (USFWS 1996).

Feeding in the intertidal zone and in the debris wrackline, chicks are very vulnerable to human disturbance (including pets) and predation. When chicks are disturbed, they often head towards the dunes, where much less food is available. Chicks will not return to the intertidal area until well after the disturbance has passed. When the disturbance happens repeatedly, as it does on public beaches with high use, the chicks go into energy deficit, and either starve to death or easily succumb to predators. Since 1990, loss of piping plover chicks at Trustom Pond Refuge has typically occurred during their first 10 days of life.



Plover eggs. Like most shorebirds, piping plover lay their eggs in shallow depressions on exposed sand. The eggs are extremely vulnerable to any vehicles travelling on the beach. USFWS photo

To afford the greatest level of protection from human disturbance, Alternative C proposes to establish an undisturbed feeding area on Moonstone Beach by closing the entire beach during the chick rearing period each summer. That period runs generally from late May until mid-July. We would close the beach to all public entry during that time. From April 1 to late May and from mid-July to September 15, the remainder of the piping plover nesting season, we would place symbolic fencing approximately 10 feet above the mean high tide line to allow for increased wildlife-dependent public use in the intertidal zone. All other management strategies proposed in Alternative B for piping plover and least tern would be implemented, including increased predator management and hiring additional personnel to increase the level of outreach and education.

We expect mixed public reaction to this modified seasonal closure. Some local people have expressed a desire for a modified beach closure because it would provide a larger area to access for walking along the beach during periods of high tide early and late in the summer. Under current management, people are restricted from walking above the mean high tide line, which is the Refuge boundary, during the entire nesting season (April 1 to September 15). High tides during the summer often rise above the mean high tide line, thus preventing people from walking along the beach. Increased access would benefit individuals engaged in wildlife observation and photography, both of which are priority wildlife-dependent uses.

On the other hand, many of the current beach users are not engaged in wildlife-dependent activities. We predict a new seasonal closure would cause confusion among the public. It took several years for returning beach users to accept and adapt to the current closure. We recognize that another change could potentially increase negative public perception of piping plover management.

The modified seasonal closure would also involve slightly more work on the part of Refuge staff, who would need to install and maintain additional symbolic fencing between the mean high tide line and the water. To alert visitors to the changes, increased outreach and education would be needed during the first two seasons.

We recognize that we cannot implement this action independently. Since the State owns the intertidal zone, a proposal to close it would require State approval. We would work with the RI CRMC and the RI DEM to implement Alternative C modified closure.

Overall, Alternative C would benefit piping plover and least tern at Trustom Pond Refuge over the long term by providing undisturbed feeding sites during the critical chick rearing period. We hope this action would result in increased fledging rates, but we are not certain, since other, uncontrollable factors affect chick survival. Public support of this change would likely be mixed. This action provides increased access for walking along the shoreline above the mean high tide line at the beginning and end of the nesting season, but would fully restrict public access to the water from late May to mid-July, when chicks are hatched but not fledged.

Alternative C also proposes to dramatically increase land acquisition by adding an additional 11,550 acres to the Refuge Complex. As stated with Alternative B, land acquisition indirectly benefits species as habitat is precluded from development and sensitive areas would be actively managed and restored to benefit species of concern.

Alternative D

Alternative D would result in all the same impacts on species of concern stated for Alternative A, except for additional protection for piping plover and least tern populations. Alternative D would implement the modified seasonal beach closure proposed in Alternative C, providing direct benefits to piping plover and least tern chicks during the most critical stage of nesting.

As described for Alternative C, this modified seasonal closure would have mixed public results. Some individuals would appreciate the increased access during parts of the season, while others would be adverse to another change in management direction. We would evaluate the extent of public opposition from responses received during the public comment and review period following release of this draft CCP/EA.

Summary

Alternative C best meets the intent of Goal 1, providing the greatest protection to species of concern on Trustom Pond Refuge. Alternative B follows with increased protection for species of concern, but not quite to the extent of Alternative C. Alternative D would provide increased protection to piping plover and least tern, but not to other species of concern to the extent of Alternative B. Alternative A maintains the status quo, providing no change to current management. We will begin Section 7 consultation to ensure compliance with the Endangered Species Act following release of this draft CCP/EA.

Cultural Resources

Alternative A (Current Management)

Existing surveys of cultural resources have been limited in area and scope. While no management actions are proposed that would adversely impact the integrity of known sites, also no management actions are proposed that would enhance our knowledge of cultural resources or improve management for cultural resources on Trustom Pond Refuge. We would survey all future, ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act. We expect neutral impacts on cultural resources over the short and long terms.

Alternative B (The Proposed Action)

Alternative B proposes a cultural resources overview of the Refuge Complex, training more Refuge staff in Archeological Resource Protection Act enforcement, and conducting an extensive field investigation of Trustom Pond Refuge. In addition, Alternative B proposes to develop a partnership agreement with the Narragansett Indian Tribal Council to encourage cooperation in interpretation, identification, and protection of cultural resources. These actions would directly benefit cultural resources over both the short and long terms by increasing information available to Refuge staff, identifying new sites, and improving protection and interpretation of recorded sites.

As with Alternative A, we would survey all future, ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act.

Alternative C

The impacts noted for Alternative B would be the same under Alternative C, except that Alternative C would develop both a cultural resources environmental education curriculum for use in local schools, and a cultural resource interpretive programs on the Refuge. These would indirectly benefit cultural resources on the Refuge by raising public awareness, understanding, and appreciation.

Alternative D

The impacts noted for Alternative A on cultural resources would be the same under Alternative D, except for indirect benefits from establishing a partnership agreement with the Narragansett Indian Tribal Council and developing environmental education and interpretive materials.

Summary

Alternative C provides the greatest direct and indirect benefits to cultural resources on Trustom Pond Refuge. Alternative B provides slightly less, while Alternative D follows with no direct benefits, but increased indirect benefit. Alternative A proposes no change to current management. All alternatives would comply with the Archeological Resources Protection Act, and we would survey all future ground-disturbing projects in compliance with Section 106 of the National Historic Preservation Act under every alternative. We will begin a Section 106 review following the release of this draft CCP/EA.

Public Use*Alternative A (Current Management)*

Although we expect a 10-percent increase in the number of visitors across the Refuge Complex, current public use activities would not change under Alternative A. No additional Refuge staff or funds would be allocated for public use or visitor services. We would evaluate public uses on newly acquired lands on a case-by-case basis after the lands are acquired. We would continue existing priority public uses if found to be compatible (see Appendix E).

Staff shortages have limited our ability to address non-wildlife-dependent activities. Enforcement has been inconsistent and limited. The most problematic, recurring, non-wildlife-dependent uses at Trustom Pond Refuge are jogging on trails, and swimming and sunbathing on Moonstone Beach. While we closely monitor swimming and sunbathing during the piping plover nesting season, after September 15, up to 200 people can be seen sunbathing on the beach during warm days in the fall. Other non-wildlife-dependent uses on Trustom Pond Refuge trails include bicycle riding, horseback riding, and dog walking. Alternative A would not provide additional law enforcement or operating funds to deal with these uses.

While difficult to quantify, we predict a 10-percent increase in the level of non-wildlife-dependent uses, corresponding with the 10-percent increase in overall visitation on the Refuge Complex. We expect that the limited staff and resources available to deal with non-wildlife-dependent users would result in increasingly negative impacts on the quality of experience for priority wildlife-dependent Refuge visitors.

Overall, Alternative A would result in very little change to the types of activities occurring on the Refuge, and would continue limited enforcement on non-wildlife-dependent activities, resulting in increased user conflicts. Although difficult to quantify, we predict diminished wildlife and habitat values over the long term as a result of non-priority public use activities.

Alternative B (The Proposed Action)

Alternative B proposes to increase priority public use opportunities on Trustom Pond Refuge in several ways. In addition to actions outlined in Alternative A, Alternative B would develop a Refuge Complex Visitor Services Plan to address program needs and opportunities, identify target audiences, and determine how to measure and evaluate success. Alternative B also proposes to establish formal agreements with existing partners to address visitor service planning and funding.

We would complete a deer management plan, which might recommend a public hunt. We would base the objectives for a deer hunt on the need to maintain deer populations within the habitat carrying capacity or to reduce threats to human health and safety. Service policy requires a separate environmental assessment, compatibility determination, public review and comment, and annual hunt plan before implementation.

Alternative B does not propose any changes to fishing opportunities at Trustom Pond Refuge. This would result in a neutral impact on the fishing public.

Alternative B proposes expanding environmental education opportunities by developing curriculum-based programs using the improved outdoor classroom sites at Trustom Pond Refuge. We would develop additional educational programs featuring the grassland restoration and salt pond ecology sites on the Refuge, and establish a volunteer environmental education corps to help develop and implement the program. The combination of these proposed actions would result in a positive impact by improving the quality of environmental education opportunities at Trustom Pond Refuge.

Alternative B would eliminate portions of redundant trail and restrict access to designated trails. Less than half a mile of redundant trail in the existing 3-mile trail system would be eliminated. Some visitors may be inconvenienced by the reduction, but the remaining trail system would continue to access the key destination points on the Refuge. In addition, Alternative B would benefit visitors requiring barrier-free access by developing a barrier-free trail and observation platform on Trustom Pond.

Alternative B would improve interpretive pamphlets and interpretive displays along trails. We would construct interpretive exhibits to describe grassland restoration, barrier beach management, and salt pond ecology. A self-guided wildlife interpretive pamphlet, watchable wildlife pamphlets, and species checklists would be developed to enhance the wildlife observation experience for Refuge visitors. Each of these actions would greatly expand the opportunities for environmental interpretation and would improve the quality of visitor experience at Trustom Pond Refuge.

On newly acquired lands, we would allow priority wildlife-dependent public use to continue on an interim basis unless they do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition. This could result in a negative impact on some individuals now using these lands for non-wildlife-dependent activities, but the action would support Refuge goals.

Alternative B would eliminate all inappropriate and incompatible public uses by 2005. Jogging, swimming and sunbathing, and dog walking are the most prevalent of these activities. Additional non-wildlife-dependent uses on trails include bicycle riding and horseback riding. None of these activities support a priority public use, nor are they needed to meet Refuge goals, nor do they contribute to the purpose for which the Refuge was established. Further, these activities diminish the quality of experience for visitors engaged in priority public uses.

Eliminating swimming and sunbathing would be the biggest challenge to increased compliance against non-wildlife-dependent activities, and would be ineffective until adequate resources are available. Beginning in 2001, we would dedicate increased staff time to beginning an outreach and education program. While most of the thousands of summer sunbathers are technically on State or Town of South Kingstown lands, up to 200 people can be found after September 15 on Refuge land at Moonstone Beach on sunny weekends. Public outcry and the difficulty of enforcing this proposal to close the Refuge to sunbathing should not be underestimated.

An education and outreach campaign to eliminate dog walking would also begin in 2001. Dog walking, as observed on Trustom Pond Refuge, can be very disturbing to wildlife. Dog walkers on the Refuge often let their dogs run free, and Refuge volunteers frequently observe dogs chasing wildlife on the Refuge. In addition, many Refuge visitors do not like to be confronted by dogs, or their feces, while observing wildlife on Refuge trails. Dog feces carry pathogens that can introduce diseases to Refuge wildlife; they can also detract from a pleasant, wildlife-oriented experience.

The presence of joggers and bicyclists on trails compromises safety, especially for people using wheelchairs or walking aids. Trail width and visibility can often make group passage unsafe. These activities can diminish the quality of experience for visitors engaged in wildlife observation and photography, since wildlife are more likely to flee from these activities than from walking. While bicyclists and joggers would lose opportunities, we predict this action would improve the quality of experience for Refuge visitors engaged in priority, wildlife-dependent public uses.

Overall, Alternative B would eliminate all non-wildlife-dependent uses, but would maintain or increase opportunities for several priority public uses. Waterfowl hunting would continue on the 20-acre upland site; wildlife observation and photography opportunities would improve for visitors with barrier-free needs; and, environmental education and interpretation would dramatically increase. Fishing would remain the same. The proposals in Alternative B would directly benefit visitors engaged in priority wildlife-dependent activities.

Alternative C

Alternative C proposes to reduce the overall level of public use on Trustom Pond Refuge in order to minimize disturbance to wildlife and habitat. While Alternative C proposes to reduce many wildlife-dependent and non-wildlife-dependent uses, it emphasizes interpretation and educational opportunities to make Refuge visitors better stewards of wildlife and habitat.

Alternative C would eliminate public hunting. We would restore the 20-acre upland field that is now used for waterfowl hunting to native coastal sandplain grasslands, to complement adjacent restored grasslands. In the past, this area accommodated up to 14 hunters. The hunting public would be adversely affected, since areas open to hunting in Rhode Island continue to decline. Alternative C would not change current fishing opportunities, resulting in a neutral impact on the fishing public.

We would enhance environmental education opportunities at Trustom Pond Refuge, similar to Alternative B, by developing a curriculum-based education program using improved outdoor classroom sites. Alternative C would also develop a volunteer environmental education corps to implement the programs. These actions would result in a positive impact on environmental education opportunities at Trustom Pond Refuge.

Alternative C would restrict environmental interpretation, wildlife observation, and photography to designated trails in order to reduce disturbance to wildlife on Trustom Pond. We would construct interpretive signs along the trails, describing grassland restoration, barrier beach management, and salt pond ecology. The goal of these programs would be to improve the stewardship of wildlife and habitats in coastal Rhode Island.

Alternative C proposes the most aggressive schedule to eliminate all inappropriate and non-wildlife-dependent uses by 2002, as described above in Alternative B on Trustom Pond Refuge. Increased Service visibility and enforcement would ensure compliance. There is no doubt that this proposal would result in a high level of public concern about restrictions on popular activities.

On newly acquired lands, we would allow priority wildlife-dependent public use to continue on an interim basis unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Overall, Alternative C would reduce public use more than the other alternatives on Trustom Pond Refuge, thus generating the most public concern. We do not know the extent of public concern at this time, but we would evaluate it during the comment period following release of this draft CCP/EA.

Alternative D

With the exception of fishing, Alternative D proposes to increase priority, wildlife-dependent public use opportunities within our legal framework and the compatibility mandates of the National Wildlife Refuge System on Trustom Pond Refuge.

Fishing opportunities at Trustom Pond Refuge would not change from current management. We would continue to allow surf fishing outside the plover nesting season on Moonstone Beach. Trustom Pond would remain closed to fishing. With maintaining the status quo, we predict a neutral impact on fishing opportunities.

RI DEM would administer a public deer hunt on Trustom Pond Refuge under special regulations established by the Refuge (Refuge Regulations 50 CFR 32). We would also evaluate the potential for small game hunting at Trustom Pond Refuge. These actions would substantially increase hunting opportunities, since only the 20-acre waterfowl hunt now exists on the Refuge. Increasing residential development on the South Shore has resulted in fewer areas available for hunting. RI DEM and hunting and sporting clubs encourage new opportunities.

As natural habitats diminish, deer use on the Refuge will increase, and active management of deer populations will become even more important. Opening Trustom Pond Refuge to deer hunting would help keep deer within the habitat carrying capacity, and help reduce damage to native vegetation or residential landscaping. Reducing the deer herd would also help reduce vehicle-deer collisions and the public health concern about deer ticks carrying Lyme disease.

An established, annual hunting program would provide direct benefits to the local economy. As described in our publication, "National Survey of Fishing, Hunting, and Wildlife Associated Recreation" (1996), hunters in Rhode Island invest an average of \$75/trip directly into the local economy for food, lodging, transportation, licenses and equipment.

However, other Refuge visitors would likely be impacted. We predict that other priority public use activities would be restricted during hunting season to address safety concerns and avoid user conflicts. Archery only areas would reduce the perceived threat by the general public that hunting is a risk to human health and safety. During public involvement for this planning process, some individuals expressed their opposition to any form of hunting on the Refuge. We do not know the extent of public opposition.

Service policy requires preparation of a separate environmental assessment with specific actions and locations, a compatibility determination, public review and comment, and an annual hunt plan before implementing a new hunt. That separate assessment would help identify public concern, and would further evaluate potential impacts on other Refuge visitors. Under Alternative D, we would begin the environmental assessment in 2001.

Opportunities for environmental education, environmental interpretation, and wildlife observation and photography would be the same as proposed in Alternative B. These actions would greatly enhance the quality and quantity of public use opportunities, resulting in positive impacts to Refuge visitors.

Like Alternative B, Alternative D proposes to eliminate non-wildlife-dependent uses by 2005. The consequences of this action are similar to Alternative B; they would adversely impact some users, but would directly increase the quality of experience for wildlife-dependent users.

On newly acquired lands, we would allow priority wildlife-dependent public use to continue on an interim basis unless the activities do not meet the criteria stipulated in the Interim Compatibility Determination (Appendix E). We would phase out as soon as possible all non-wildlife-dependent activities that may have existed before our acquisition.

Summary

Alternative D would provide the greatest positive impact on priority public uses because of the increases in all program areas. However, this emphasis would result in a greater potential disturbance to wildlife and habitats. The extent of this risk is not known, but monitoring and evaluation would be an important part of implementation. Alternative B would increase opportunities for priority public use, but would continue to implement wildlife and habitat projects as higher priorities. Alternative C would provide the least benefit to public use, focusing almost exclusively on wildlife and habitat projects. Alternative A would not change current public use opportunities or wildlife and habitat values. Alternative B provides the best balance in meeting Goals 1 and 4 by increasing opportunities at minimal risk to wildlife and habitat values.

Cumulative Impacts

Cumulative impacts are those impacts on the physical, biological, and human environment resulting from the incremental impact of the proposed actions when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

This cumulative impacts assessment includes other agencies' or organizations' actions if they are inter-related and influence the same environment. Thus, this analysis considers the interaction of activities at the Refuge Complex with other actions occurring over a larger spatial and temporal frame of reference. Potential cumulative impacts for the proposed alternatives are described below.

Air Quality

None of the proposed alternatives are expected to have significant cumulative adverse impacts on air quality in southern Rhode Island. Some short-term deterioration in air quality would be expected from management-ignited prescribed burns and from Refuge visitors' automobile emissions. However, management-ignited prescribed fire would only occur under the stipulations of the Fire EA (1995) completed by the Refuge. These stipulations are specifically designed to minimize air quality impacts. Further, while visitors would primarily access the Refuges by automobile, most would drive less than 20 miles.

These Refuge-related activities are relatively insignificant to overall air quality in Rhode Island, minimally compounding the contributions of the industrial centers and automobiles in the greater Providence metropolitan area. Further, we predict no impacts on Class 1 air sheds, since none occur in the area. The closest Class I air sheds are in northern Maine (Moosehorn Wilderness Area) and southern New Jersey (Brigantine Wilderness).

Soils, Hydrology, Wetlands, and Water Quality

The greatest past, present, and foreseeable future adverse impact on these resources in southern Rhode Island is from increasing residential development. As development along the Rhode Island coast continues, the threats to Refuge resources, coastal salt ponds, and barrier beach habitats will increase dramatically. In particular, deteriorating water quality in coastal Rhode Island has become a priority issue for State agencies and local communities. A cooperative, watershed-level approach to protecting and managing these resources offers the greatest opportunity to cumulatively improve conditions.

The Coastal Resources Management Council (CRMC) has published Special Area Management Plans (SAMP 1982, 1998) for managing and protecting the Salt Pond Region and Narrow River watersheds. These plans recommend establishing interagency Watershed Working Groups to address and manage water quality issues. Alternatives B and C, in particular, promote active Service involvement in watershed-level protection.

We can also contribute to improved watershed conditions in three ways: Refuge acquisition of uplands and wetlands threatened with development, cooperative land protection of important habitat, and technical information exchange with landowners throughout these watersheds.

All alternatives propose to increase Service land acquisition. Alternative C proposes the most ambitious land acquisition strategy, with a proposal to acquire from willing sellers 11,550 acres throughout southern Rhode Island and Block Island. In particular, we have been active in acquiring lands adjacent to existing Refuges, which would remain a priority for acquisition.

We work with other conservation partners to cooperatively develop protection strategies for ecologically significant lands. The Nature Conservancy, six local land trusts, and RI DEM all actively facilitate land protection and cooperative land management near Refuges.

Local town governments are active as well. A partnership among the towns of North Kingstown, South Kingstown, and Narragansett has established the Narrow River Watershed Advisory Council and the Narrow River Land Trust. These groups work together to help protect the water quality, associated wildlife, and habitats in the Narrow River watershed. The Aquidneck Island Land Trust is actively working with the Town of Middletown and other conservation partners to identify and implement a land protection strategy in the watershed (which includes Sachuest Point Refuge). Further, the towns of Charlestown, South Kingstown and Narragansett are supporting conservation by adopting CRMC's recommendation of a 2-acre minimum lot size in the coastal zone to reduce nutrient loading. This would benefit the watersheds associated with Ninigret, Chafee, and Trustom Pond Refuges. Also, each of these towns has very active land trusts.

On Block Island, the cumulative benefits of cooperative land protection are particularly noteworthy. The Town of New Shoreham, the Block Island Land Trust, the Block Island Conservancy, the Audubon Society of Rhode Island, The Nature Conservancy, and the Service work together to prioritize and implement land protection strategies. This coalition, with support of the local citizenry, has successfully protected approximately 30 percent of the island from development.

Each of the alternatives proposes various levels of participation in ongoing, watershed-based partnerships. One of their objectives is to share technical information on things like restoration and habitat management techniques. When combined with actions by other Federal, State, and local organizations working in southern Rhode Island and Block Island, we expect all of the alternatives to have a positive cumulative effect on soils, hydrology, wetlands, and water quality within their respective watersheds.

Biological Resources

All alternatives are intended to maintain or improve biological resources on the Refuge, in Rhode Island, and within the Connecticut River/Long Island Sound Ecosystem. The combination of Refuge actions with other organizations' actions could result in significant, beneficial cumulative effects by: (1) increasing protection and management for threatened and endangered species; (2) improving grasslands and wetlands habitats that are regionally declining; and (3) reducing invasive, exotic plants and animals.

The Refuge Complex staff, in conjunction with volunteers and the Friends group, now manages 70 percent of active piping plover nesting sites in Rhode Island. The alternatives propose varying levels of increased protection and management for the Rhode Island breeding population. Despite the fact that the Rhode Island population is a small proportion (6 percent at 41 pairs) of the New England Atlantic piping plover population, any loss or degradation of these nesting areas would have an adverse cumulative effect on the overall Atlantic coast population. Loss of habitat in Rhode Island would further isolate the two nesting concentration areas: the Massachusetts population, which has the highest number of nesting pairs (508 pairs), from the New York population (243 pairs). Further, it is significant that in 1999, the Rhode Island piping plover productivity level (chicks fledged/pair) was 1.7, second only to Massachusetts (at 2.67 chicks fledged/pair) in success along the Atlantic coast.

All alternatives propose to restore and maintain more than 450 acres of grassland or early successional shrub and grassland habitats. Alternatives B and C also propose to establish educational and outreach programs to promote grassland restoration throughout southern Rhode Island. Given the small percentage of grassland in the area, we expect these actions to significantly increase early successional shrub and grassland habitats with minimal impacts on other vegetation and wildlife. A primary objective of this management is to increase habitat for nesting grassland bird species.

Invasive plants are a problem throughout the Connecticut River/Long Island Sound Ecosystem. Combined with other groups, including other refuges and Ecological Services Field Offices, the invasive plant control actions proposed in each alternative would result in a cumulative impact that decreases their abundance. Alternatives B and C would contribute the greatest cumulative impact through more aggressive, direct control and public outreach and education.

Cultural Resources

We expect none of the alternatives to have significant adverse cumulative impact on cultural resources in Rhode Island. Beneficial impacts would occur at various levels, depending on the alternative, because of proposed environmental education and interpretation programs on all Refuges, increased field surveys, and development of a formal partnership with the Narragansett Indian Tribe.

Human Resources

We expect none of the alternatives to have a significant adverse cumulative impact on the economy of southern Rhode Island. Although Federal land acquisition reduces property tax revenue, affected towns are compensated with refuge revenue sharing payments, and also should realize a reduction in cost of community services. In addition, the proposed acquisitions make up only a small portion of any town. We expect increased visitation to the Refuge to bring revenue to local communities through increased tourism to the South County area, but we do not predict a significant increase in overall revenue in any area.

The land protection strategy in Alternatives B and C would facilitate the South Kingstown Land Trust's plan to develop a greenway corridor and establish a hiking trail between the Great Swamp Management Area and Trustom Pond Refuge.

The State and towns all offer non-wildlife-dependent public uses on their lands; thus, we do not expect the proposed alternatives to cumulatively affect non-wildlife-dependent public uses in Rhode Island. The exception is dog walking at Sachuest Point. Middletown now restricts dog walking from all public areas. The proposed elimination of dog walking would further reduce options for people seeking this activity, restricting them more to private lands or roads.

The proposed alternatives would cumulatively increase priority, wildlife-dependent recreation in southern Rhode Island. This would supplement recreational opportunities offered by other State and private organizations. However, the Refuges would provide an experience unique from other parks and open spaces, because they provide natural settings with unmatched wildlife observation experiences.

Aesthetics

As the Rhode Island coastal communities continue to expand, development pressure and recreational demands on the coastal ecosystem increase. State and town parks and beaches already receive most of the recreational use. Converting open space to residential housing threatens the capacity of the existing State and town lands to provide outdoor recreation. The Refuges provide additional open space perpetually maintained as natural habitat, and provide an alternative destination for those looking to escape the everyday bustle. In this way, they become refuges not only for wildlife, but for humans as well.

Relationship Between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity

This section evaluates the relationship between local, short-term uses of the human environment and maintaining long-term productivity of the environment. By long-term we mean that the impact would extend beyond the 15-year planning horizon of this draft CCP/EA. Short-term means less than 15 years.

All of the alternatives are clearly aimed at enhancing the long-term productivity and sustainability of natural resources on the Refuges. To varying degrees, the alternatives propose actions that promote watershed- or ecosystem-wide partnerships, planning, and land protection. Outreach and environmental education are a priority in each alternative to encourage Refuge visitors to be better stewards of our environment.

All alternatives propose eliminating existing non-wildlife-dependent uses determined to be incompatible (Appendix E) in order to reduce impacts on wildlife and habitats. Alternative C proposes the most aggressive time frame for eliminating these uses. It would enhance long-term productivity on the Refuge Complex, with a corresponding tradeoff of non-wildlife-dependent public use. Alternative A would provide the least support for maintaining long-term productivity since it does not provide staffing or funding to enforce restrictions on incompatible public uses.

Unavoidable Adverse Impacts

None of the alternatives would result in an unavoidable adverse environmental impact. We will undertake biological monitoring as part of all Alternatives, to enable Refuge staff to adapt management actions and address any unforeseen situations.

Potential Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those which cannot be reversed, except perhaps in the extreme long term or under unpredictable circumstances. An example of an irreversible commitment is an action which contributes to a species' extinction. Once extinct, it can never be replaced.

In comparison, irretrievable commitments of resources are those which can be reversed, given sufficient time and resources. An example of an irretrievable commitment is the conversion of shrub land to grassland. If for some reason conversion were to terminate, the grassland would gradually revert to shrub land.

Only a few actions proposed in the alternatives would result in an irreversible commitment of resources. One is committing land to the construction of the new Refuge Complex Headquarters/Visitor Center. All alternatives propose this action. A separate environmental assessment will evaluate the site-specific impacts of constructing this facility.

Refuge land acquisition results in another irreversible commitment of resources impacting affected communities. Land acquisition is considered an irreversible commitment because it is exceptionally rare that Refuge lands revert to any other ownership. In the relatively small communities in Rhode Island, when we acquire land it affects land-use patterns, local businesses, and municipal tax revenues. Refuge land acquisition removes acreage from private ownership and town property tax rolls, impacting local property tax revenue and associated secondary revenue that would result from development. However, Refuge lands provide long-term public benefits by creating public use areas, protecting open space, watersheds, and view sheds, decreasing the cost of community services, and increasing the value of homes adjacent to Refuge lands.

Several proposed actions would result in an irretrievable commitment of resources. The grassland habitat restoration is one example. Species assemblages may shift as a result of the habitat work; grassland-associated species may be recruited into the area, while edge- and shrub-using species may move elsewhere. Other actions proposed to manage wildlife populations, including hunting and predator control, would affect local populations of these species; however, they are designed to enhance habitat quality for species of concern or other native species. All alternatives propose invasive plant control to promote a shift back to natural vegetative communities. None of these actions would adversely impact the viability of any species or plant communities on the Refuge, in Rhode Island, or in the Connecticut River/Long Island Sound Ecosystem.

Proposed wildlife and habitat management actions would result in an irretrievable loss of public use. All Alternatives except Alternative A (Current Management) would eliminate non-wildlife-dependent public uses. Management of piping plover, migrating shorebirds, nesting colonial wading birds, and rare plant sites would restrict public access to certain parts of the Refuges either seasonally or permanently. Management of black duck and harlequin duck would also result in some irretrievable loss of hunting opportunities. However, each of the actions mentioned are designed to protect natural resources over the long term and fulfill the Mission of the National Wildlife Refuge System and the purposes for which the Refuges were established.

Table 4-1. *A summary of the environmental consequences for the Refuge Complex.*

Refuge Complex	Alternative A, <i>Current Management</i>	Alternative B, <i>Proposed Alternative</i>	Alternative C	Alternative D
Air Quality	<p>Prescribed fire: potential short-term pollution from burning up to 370 acres per year</p> <p>Vehicle emissions: projected increase of 35,000 visitors</p> <p>Indirect benefits from maintaining existing Refuge habitats and protecting up to 735 additional acres of open space and vegetated areas, which act as pollution filters</p>	<p>Prescribed fire: potential short-term pollution from burning up to 670 acres per year</p> <p>Vehicle emissions: projected increase of 70,000 visitors</p> <p>Greater indirect benefits from protecting up to 3,200 additional acres of open space and vegetated areas</p>	<p>Prescribed fire: potential short-term pollution from burning up to 670 acres per year</p> <p>Vehicle emissions: projected increase of 52,000 visitors</p> <p>Greater indirect benefits from protecting up to 11,500 additional acres of open space and vegetated areas</p>	<p>Prescribed fire: negligible impacts from burning less than 3 acres/year</p> <p>Vehicle emissions: projected increase of 87,500 visitors</p> <p>Indirect benefits from maintaining existing Refuge habitats and protecting up to 735 additional acres of open space and vegetated areas</p>
Socio-economic Factors	<p>Loss of annual property tax revenue from acquisition of up to 735 acres</p> <p>\$69,000/year increase in Refuge Revenue Sharing Payments</p> <p>\$70,000/year increase in local, visitation-related spending</p>	<p>Loss of annual property tax revenue from acquisition of up to 3,200 acres</p> <p>\$338,000/year increase in Refuge Revenue Sharing Payments</p> <p>\$1.4 million/year increase in local, visitation-related spending</p>	<p>Loss of annual property tax revenue from acquisition of up to 11,500 acres</p> <p>\$1.1 million/year increase in Refuge Revenue Sharing Payments</p> <p>\$1.0 million/year increase in local, visitation-related spending</p>	<p>Loss of annual property tax revenue from acquisition of up to 735 acres</p> <p>\$69,000/year increase in Refuge Revenue Sharing Payments</p> <p>\$1.7 million/year increase in local, visitation-related spending</p>
Cultural Resources	<p>Neutral impacts (ground disturbing project areas are surveyed in compliance with the National Historic Preservation Act)</p>	<p>Positive impacts from Cultural Resources Overview, partnerships, training, and protection of known sites</p>	<p>In addition to benefits in Alternative B, increased field surveys in high probability areas would improve available information</p>	<p>Same as Alternative A</p>

Table 4-1. A summary of the environmental consequences of the alternatives (continued).

Block Island Refuge	Alternative A, Current Management	Alternative B, Proposed Alternative	Alternative C	Alternative D
Physical Resources <i>Soils, Hydrology, and Wetlands</i>	No impacts	Positive impact from protecting up to 100 additional acres	Positive impact from protecting up to 150 additional acres	No impacts
Biological Resources <i>Vegetation</i>	No vegetation management	Seasonal restriction would reduce negative ORV impacts to dune vegetation Indirect benefits from increased vegetation monitoring	Year-round restriction would eliminate ORV impacts to dune vegetation Indirect benefits from increased vegetation monitoring	No vegetation management
<i>Federally listed threatened and endangered species</i>	Piping plover: suitable habitat protected according to 1994 Service guidelines	Piping plover: increased protection through seasonal ORV restriction. Increased monitoring of plovers and public use in suitable Refuge habitat American burying beetle and bald eagle: indirect benefits from increased monitoring and involvement in recovery efforts on the Island	Piping plover: increased protection through year-round ORV restriction. Increased monitoring of plovers and public use in suitable Refuge habitat Indirect benefits from initiating a Piping Plover Working Group for Rhode Island American burying beetle and bald eagle: indirect benefits from increased monitoring and involvement in recovery efforts on the Island	Same as Alternative A
<i>Other species of management concern</i>	No management	Direct benefits to heron rookery from development of a site plan Increased indirect benefits to landbirds, reptiles, and amphibians from inventories and monitoring Deer populations would be managed in partnership with adjacent landowners, RI DEM, and Town of New Shoreham	Same as Alternative B	Same as Alternative A
Public Use <i>Priority public uses</i>	No impacts to fishing, wildlife observation and photography opportunities; they would continue, unsupported by the Refuge. No ADA-compliant infrastructure is in place	Increased opportunities for environmental education and interpretation Seasonal ORV restriction would decrease access for surf fishing	Increased opportunities for environmental education and interpretation Year-round ORV restriction would further reduce access for surf fishing	Increased opportunities for environmental education, interpretation, and hunting
<i>Other uses</i>	Negative impacts – minimal enforcement to control incompatible activities	Seasonal staff will increase Service presence, and ensure consistent enforcement and outreach to control incompatible activities	Same as Alternative B, except incompatible uses would be eliminated sooner	Same as Alternative B

Table 4-1. A summary of the environmental consequences of the alternatives (continued).

Ninigret Refuge		Alternative A, <i>Current Management</i>	Alternative B, <i>Proposed Alternative</i>	Alternative C	Alternative D
Physical Resources <i>Soils, Hydrology, and Wetlands</i>	Wetlands: positive impacts from runway removal on 70 acres (increased percolation, more natural hydrologic flow, reduced freshwater input to Ninigret Pond) Negligible impacts to soils and hydrology from prescribed fire and mechanical treatments	Wetlands: in addition to positive impacts from 70 acre runway project, an additional 70 acres of wetlands would be restored Indirect, positive impacts from protecting up to 500 additional acres in watershed	Wetlands: impacts similar to Alternative B; up to 3,100 additional acres would be protected in the watershed	Same as Alternative A	
Biological Resources <i>Vegetation</i>	Positive impacts from converting 70 acres of runway to early successional, native vegetation Treatment of 150 acres of mid-late seral shrub to early successional habitat would create additional habitat diversity	Same as Alternative A, with additional benefits from up to 25 acres/year invasive plant control Positive impacts to rare plant sites from development of site management plans	Same as Alternative B	Same as Alternative A, except that our ability to sustain restored areas and control invasive plants would be hindered without use of prescribed fire or herbicides	
<i>Federally listed threatened and endangered species</i>	Piping plover: suitable habitat protected according to 1994 Service guidelines, with additional year-round restriction on ORV travel above mean high tide line	Piping plover: in addition to Alternative A, increased benefits from predator control	Same as Alternative B	Same as Alternative A	
<i>Other species of management concern</i>	Positive impacts to early successional (e.g. grassland) dependent species with runway removal and 150 acre early successional treatment Negative impact to mature-shrub dependent species in the 150 acre treatment area	In addition to Alternative A: Increased indirect benefits to landbirds, reptiles, and amphibians from inventories and monitoring Deer populations would be managed in partnership with adjacent landowners, RI DEM, and Town of Charlestown	Same as Alternative B	Same as Alternative A, plus a Refuge deer hunt to actively manage populations	
Public Use <i>Priority public uses</i>	No impact to existing opportunities for wildlife observation, photography, fishing, or environmental education and interpretation Recent trail construction is ADA compliant	Increased opportunities for all priority public uses, including a limited-access waterfowl hunt Commercial shellfishing will be negatively impacted by special use permit system	Increased opportunities in environmental education, emphasizing teacher training Commercial shellfishing will be impacted by special use permit system	Same as Alternative B, with the addition of a deer hunt	
<i>Other uses</i>	Negative impact – limited enforcement to control incompatible activities	Increased Service presence would ensure consistent enforcement and outreach to control incompatible activities	Same as Alternative B, except that incompatible uses would be eliminated sooner	Same as Alternative B	

Table 4-1. A summary of the environmental consequences of the alternatives (continued).

Chafee Refuge	Alternative A, <i>Current Management</i>	Alternative B, <i>Proposed Alternative</i>	Alternative C	Alternative D
Physical Resources <i>Soils, Hydrology, and Wetland</i>	Indirect positive impact from protecting up to 375 additional undeveloped acres in the watershed	Indirect positive impact from protecting up to 1,000 additional undeveloped acres in the watershed	Indirect positive impact from protecting up to 3,000 additional undeveloped acres in this watershed	Same as Alternative A
Biological Resources <i>Vegetation</i>	No vegetation management	Positive impact to native vegetation from up to 25 acres/year invasive plant control	Same as Alternative B	Same as Alternative A
<i>Federally listed threatened and endangered species</i>	None documented on the Refuge	None documented on the Refuge	None documented on the Refuge	None documented on the Refuge
<i>Other species of management concern</i>	No management	Positive impact to waterfowl from development of cooperative waterfowl plan Indirect benefits to landbirds, reptiles, and amphibians from increased baseline inventories and monitoring Deer populations would be managed in partnership with adjacent landowners, RI DEM, and the Towns of South Kingstown and Narragansett	Same as Alternative B	Same as Alternative A, plus a Refuge deer hunt to actively manage populations
Public Use <i>Priority public uses</i>	Current levels of fishing would continue, unsupported by the Refuge No infrastructure exists to support public use	Positive impact – increased opportunities for environmental education and interpretation, wildlife observation, and photography through better access, including ADA compliant infrastructure	Increased opportunities in environmental education, emphasizing teacher training Negative impact to fishing opportunities, which would be limited to control shoreline erosion	Same as Alternative B, with the addition of deer and pheasant hunts
<i>Other uses</i>	Negative impact – limited enforcement to control incompatible activities	Boundary posting and staff monitoring would ensure consistent enforcement and outreach to control incompatible activities	Same as Alternative B, except that incompatible uses would be eliminated sooner	Same as Alternative B

Table 4-1. A summary of the environmental consequences of the alternatives (continued).

Sachuest Point Refuge	Alternative A, <i>Current Management</i>	Alternative B, <i>Proposed Alternative</i>	Alternative C	Alternative D
Physical Resources <i>Soils, Hydrology, and Wetland</i>	Positive impact from 15 acre wetland restoration project (re-establishing freshwater flow and reducing Phragmites) Negligible impacts to soils from mechanical and prescribed fire treatments in 42 acre upland restoration area	Increased benefit through 25 acre saltmarsh restoration project in addition to 15 acre wetland restoration project Positive impact from controlling shoreline access to minimizing erosion Negligible impacts to soils from mechanical and prescribed fire treatments in 82 acre upland restoration area Indirect benefits from protecting up to 300 additional acres in the watershed	In addition to Alternative B, up to 1,500 additional acres would be protected in the watershed	Same as Alternative A
Biological Resources <i>Vegetation</i>	Positive impact from restoring early successional habitat and controlling invasive plants on 42 acres, which will increase native habitat diversity	In addition to Alternative A: Increased benefit with expansion of restoration project to include 82 acres Indirect positive benefit from protecting up to 300 additional acres in the watershed	Same as Alternative B	Same as Alternative A, except that our ability to sustain restored areas and control invasive plants would be hindered without use of prescribed fire or herbicides
<i>Federally listed T & E species</i>	None documented on the Refuge	None documented on the Refuge	None documented on the Refuge	None documented on the Refuge
<i>Other species of management concern</i>	Positive impact to early successional-dependent species in 42 acre project area Corresponding negative impact to dependent on mature shrub habitat	Positive impact to early successional-dependent species in 82 acre project area Corresponding negative impact to dependent on mature shrub habitat Indirect benefits to landbirds, reptiles, and amphibians from monitoring and inventories	Same as Alternative B	Same as Alternative A
Public Use <i>Priority public uses</i>	Environmental education and interpretation opportunities would improve with renovation of the Sachuest Point Visitor Center No ADA compliant public use infrastructure exists, outside of the Visitor Center	Positive impacts to public use opportunities – increased funding and staffing, and ADA compliant trails We would pursue a regulation from RI DEM to close the intertidal zone to hunting, negatively impacting this use	Increased opportunities for environ. education, with teacher-training emphasis Restriction on night fishing would negatively impact fishing opportunities Wildlife observation and photography would be minimally impacted by closure of 3/4 mile of trail	Same as Alternative B, except that shoreline hunting closure would not be pursued
<i>Other uses</i>	Negative impact – limited enforcement to control incompatible activities	Permanent staff stationed at the Refuge would provide consistent enforcement and outreach to control incompatible uses	Same as Alternative B, except that incompatible uses would be eliminated sooner	Same as Alternative B

Table 4-1. *A summary of the environmental consequences of the alternatives (continued).*

Trustom Pond Refuge	Alternative A, Current Management	Alternative B, Proposed Alternative	Alternative C	Alternative D
Physical Resources <i>Soils, Hydrology, and Wetland</i>	Negligible impacts to soils from mechanical and prescribed fire treatments on 136 acre project area Positive impacts to aquatic resources from breaching Trustom Pond (once each spring) and Cards Pond (at adjacent landowners' request) Indirect, positive impact from protecting up to 358 acres in watershed	Same as Alternative A, plus indirect benefits from development of an Integrated Resource Plan for Trustom Pond Indirect benefits from protecting up to 1,300 additional acres in the watershed	In addition to Alternative B, up to 3,800 additional acres would be protected in the watershed	Same as Alternative B
Biological Resources <i>Vegetation</i>	Negligible positive impact from limited invasive plant control work completed each year Positive impact from restoring early successional habitat and controlling invasive plants on 136 acres, which will increase native habitat diversity Corresponding negative impact to existing mid-late seral shrub habitat in restoration area	In addition to Alternative A, benefits from up to 25 acres/year of invasive plant control Indirect benefits to rare plant sites from development of site management plans	In addition to Alternative B, additional benefit from converting 20 acres of non-native grasses to early successional native habitat	Same as Alternative A, except that our ability to sustain restored areas and control invasive plants would be hindered without use of prescribed fire or herbicides
<i>Federally listed threatened and endangered species</i>	Piping plover: current management on Moonstone Beach would continue to exceed 1994 Service guidelines Piping plover nesting areas in the South Shore would continue to benefit from Refuge resource support and coordination, to the extent funding has allowed each year	Piping plover: Same as Alternative A, with additional benefits from increased predator control and outreach Benefits throughout the South Shore from funding a Rhode Island Piping Plover Coordinator	Piping plover: Same as Alternative B, with additional benefits from modified closure on Moonstone Beach (chicks should be better protected during most critical nesting stage)	Positive impact from modified closure on Moonstone Beach; larger negative impact from dropping Refuge support for the South Shore Piping Plover Program

Table 4-1. A summary of the environmental consequences of the alternatives (continued).

Trustom Pond Refuge	Alternative A, Current Management	Alternative B, Proposed Alternative	Alternative C	Alternative D
Biological Resources <i>Other species of management concern</i>	<p>Positive impacts to early successional-dependent species with 136 acre project area</p> <p>Limited benefits to those species requiring > 100 acres contiguous habitat</p> <p>Mature shrub-dependent species would be negatively impacted by the project</p> <p>Least tern would benefit from nest area fencing and predator control</p> <p>Black duck and other waterfowl benefit from limited public access to Trustom Pond and continued addling of mute swan eggs</p>	<p>In addition to Alternative A:</p> <p>Indirect benefits to species of management concern through development of Integrated Resource Plan for Trustom Pond</p> <p>Benefits to black duck and other waterfowl from increased swan control</p> <p>Indirect benefits to landbirds, amphibians, and reptiles from inventories and monitoring</p> <p>Deer populations would be managed in partnership with adjacent landowners, RI DEM, and Town of South Kingstown</p>	Same as Alternative B	Same as Alternative A
Public Use <i>Priority public uses</i>	<p>No impacts to existing opportunities for wildlife observation and photography, seasonally restricted surf fishing, environmental education and interpretation, and hunting on 20 acres of upland field</p> <p>Visitors would continue to benefit from the Visitor Contact Station</p> <p>No ADA compliant public use infrastructure exists</p>	<p>Same as Alternative A, with expanded environmental education and interpretive opportunities</p> <p>Decreased access through elimination of 1/2 mile of redundant trail; opportunities for ADA compliant construction of certain trails</p>	<p>Increased environmental education opportunities, emphasizing teacher training</p> <p>Negative impact to hunters from closure of 20 acre upland hunting opportunity</p> <p>We would expect mixed reactions to the modified closure on Moonstone Beach</p>	<p>Increased opportunities for all priority uses except fishing, which would remain the same</p> <p>A deer hunt would benefit hunters</p> <p>We would expect mixed reactions to the modified closure on Moonstone Beach</p>
<i>Other uses</i>	<p>Negative impact – limited enforcement to control incompatible activities</p>	<p>Increased Service presence would ensure consistent enforcement and outreach to control incompatible uses</p> <p>Increased opportunities for research</p>	<p>Same as Alternative B, except that incompatible uses would be eliminated sooner</p>	Same as Alternative B



Planner Nancy McGarigal at a CCP Open House
USFWS photo

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Turk's cap lily and swallowtail butterfly
USFWS photo

Consultation and Coordination with Others

Some Terms Used in this Chapter

The purpose of this chapter is to summarize public outreach that occurred during development of this document, including open houses, public meetings, planning update mailings. In addition, we have summarized the consultation and coordination with partners. We begin by defining a few terms used in the chapter.

adjacent land owners - addresses of adjacent property owners were kept separate from the *refuge mailing list*, on the assumption that this group would want to know about the CCP process, but would not wish to receive future mailings, nor review the draft and final CCPs. People on this list were instructed to contact the planning team if they wished to be further included in the planning process. Anyone who subsequently contacted the Refuge or planning team was added to the *refuge mailing list*.

focus groups - potential partners or organizations with special interests in (or information pertaining to) the Refuge Complex.

Issues Workbook - a packet of questions distributed in order to solicit public comments on the Refuge Complex and the planning process. Basic information on the Refuge Complex was bundled with the *Issues Workbooks*. Workbooks were not randomly distributed, nor were questions intended to have statistical significance.

Planning Updates - newsletters distributed, primarily through mailing lists, in order to update the interested public on the status of the CCP project.

Refuge mailing list - the “original” RI Refuge Complex mailing list which preceded the CCP process. This list contained names and addresses of people with an interest in the Refuge. As part of the planning process, the list was continually updated to include conservation agencies, sporting clubs, Congressionals, workbook respondents, open house/focus group attendees, etc.

Chronologically-listed activities

May 28 - 31, 1996

Outreach activity: planning workshop, Charlestown

Purpose: set goals and objectives for future management of the Rhode Island Refuges

Number of non-FWS participants: 7

Audience: The Nature Conservancy (TNC), RI DEM, URI Dept. of Natural Resource Science, Audubon Society of RI, Coastal Resources Management Council, Norman Bird Sanctuary

Topics included: objective setting process, RI Refuges introduction, biological programs on Refuges, biological objectives, current public use, public use objectives, outreach, roles and responsibilities, administrative objectives

March 19, 1998

Outreach activity: Notice of Intent published in Federal Register

Purpose: notify the public of the intent to produce a Comprehensive Conservation Plan

Audience: public

April 3, 1998 (initial mailing - distribution continued through June 15)

Outreach activity: “Issues Workbook”

Purpose: educate public on mission and responsibilities of the Service, explain the CCP process, and solicit public comments on potential issues

Audience: Refuge mailing list (400+ names), adjacent landowners (Trustom Pond area; 1000+ names), visitors to Refuge office (150 copies printed), open house and focus group attendees

Topics included: CCP planning process, overview of the Service, overview of RI NWR Complex, summary of NWRS Improvement Act, refuge establishment purposes and key habitats, planning schedule, Issues Workbook soliciting comments/information on: visitation, activities taking place on refuges, public values of RI coast, problems facing RI coast, role of the Service in protecting habitats outside of RI NWR Complex, feelings on land acquisition, habitat-related concerns, non-wildlife dependant public uses, and wildlife dependant public uses

April 3, 1998

Outreach activity: Issues Workbook and cover letter sent to Congressional Aides

Purpose: inform Congressional Aides of the CCP process, solicit comments, extend invitations to open houses

Audience: aides to Rhode Island’s Congressional Offices

Topics included: Issues Workbook (see preceding “outreach activity” for content), informal invitation to open houses, dates available for briefings

April 13, 1998

Outreach activity: Open house, Sachuest Point NWR visitor center

Purpose: allow refuge volunteers to critique open house presentation and share comments and concerns on the RI NWR Complex CCP project

Number of non-FWS participants: 21

Audience: refuge volunteers, Friends of RI NWR Complex

Topics discussed: open house presentation, Web page, newsletter, condition of trails at Sachuest Point, contacting Disabled American Veterans Group

April 15, 1998

Outreach activity: Open house, Crossmills Firehouse

Purpose: educate public on mission and responsibilities of the Service, explain the CCP process, and solicit public comments on potential issues

Number of non-FWS participants: 17

Audience: public

Topics discussed: parking at Moonstone Beach w/ relation to env. education programs, off-refuge bike path from Ninigret to Trustom, possible erosion of trails at Trustom, horses on Trustom trails, hunting on (small) refuges, land acquisition, education/outreach

April 20, 1998

Outreach activity: Open house, South Kingstown High School

Purpose: educate public on mission and responsibilities of the Service, explain the CCP process, and solicit public comments on potential issues

Number of non-FWS participants: 36

Audience: public

Topics discussed: invasive plants, seasonal horseback riding on beach/trails, control of coyote population through hunting, historic structures, continuation of hunting access, public use, refuge visitation (Trustom Pond), emergency communication system at Moonstone Beach, opening of the beach during summer, flexibility of plan regarding problem species, affect of beach opening on nesting plovers and terns, wildlife inventories to monitor management, deer enclosures, aesthetics of seasonal plover fencing, mute swan control, habitat restoration, communication between refuge staff and community, gun-wielding law enforcement, disturbance of plovers by staff, citizen's review board for compatibility determinations, sunbathing at Trustom Pond Refuge.

April 21, 1998

Outreach activity: Meeting, Block Island Town Hall

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested groups

Number of non-FWS participants: 14

Audience: The Nature Conservancy on Block Island, Block Island Land Trust, Block Island Conservancy, Town of New Shoreham

Topics discussed: Refuge "house" on Beane Point, path to West Beach, plover fencing, land acquisition, hunting north of Great Salt Pond, fishing, support for conservation on Block Island, education, pine trees along beach at Ninigret, coordinating habitat management for Block Island

April 23, 1998

Outreach activity: Meeting, Audubon Society, Smithfield

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested group

Number of non-FWS participants: 7

Audience: Audubon Society of Rhode Island

Topics discussed: land protection - Rose Island, Dyer Island, Wickman Point, United Nuclear site, Run Point, headwaters of Saugatucket River, East Beach, Sandy Point Island, Napatree Point, Watch Hill, beach west of Misquamicut, coastal ponds; use of Napatree Point by boaters (vs. shorebirds), survey for small whorled begonia and other listed plant species, env. education, protection of listed species on southern Block Island, focusing protection effort along coast, visitor center staffing and displays, visitor services, review of state management plans

April 23, 1998

Outreach activity: Open house, Sachuest Point NWR visitor center

Purpose: educate public on mission and responsibilities of the Service, explain the CCP process, and solicit public comments on potential issues

Number of non-FWS participants: 17

Audience: public

Topics discussed: hunting at Sachuest Point, abundant crows in Newport area, grassland restoration, breeching of Trustom Pond, jogging on trails, one-time public events on refuge

May 11, 1998

Outreach activity: Open house, USFWS Northeast Regional Office, Hadley, MA

Purpose: Explain the CCP process and seek issues and concerns to be addressed in the CCP.

Number of non-FWS participants:

Audience: Service employees

Topics discussed: emphasizing fish and aquatic resources, Regional Resources Assessment, lead sinkers, protection of salt ponds, hunting opportunities, public involvement in setting goals and objectives, wildlife-conservation emphasis of Improvement Act

June 1, 1998

Outreach activity: letter mailed to addresses on mailing list

Purpose: extend “deadline” for workbook responses (originally set at June 1), remind people to send in workbooks

Audience: mailing list (with newly-added open house attendees)

June 8, 1998

Outreach activity: Meeting, University of Rhode Island

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested groups

Number of non-FWS participants: 7

Audience: URI faculty (Natural Resources Department), RI Coastal Resource Management Council, RI Natural Heritage Database

Topics discussed: responses to Issues Workbooks, public education/outreach, public use (surveying, preventing illegal uses), student research projects on Refuges, biological monitoring (for baseline data and to evaluate management practices), research as a potential Refuge activity

June 8, 1998

Outreach activity: Meeting, University of RI

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested groups

Number of non-FWS participants: 5

Audience: Westerly Land Trust, Narrow River Land Trust, Land Conservancy of North Kingstown, Charlestown Conservation Commission, Town of Narragansett, South Kingstown Land Trust

Topics discussed: fragmented land protection efforts, protection based on watersheds, grassland maintenance and restoration, restoration at Sachuest Point, invasion by Autumn Olive, education/outreach, possibility of South County visitor center, United Nuclear site, Ninigret restoration (runway & building removal), protection of Narrow River/Pettaquamscutt Cove

June 8, 1998

Outreach activity: Meeting, Middletown

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested group

Number of non-FWS participants: 5

Audience: Middletown Conservation Commission
Topics discussed: monitoring of CCPs, hunting on refuges, foxes, stocking of game/native species, cleanup of landfill on Sachuest Point, protecting people from wildlife, education/outreach (spreading the Service’s message), land acquisition funding, Navy Land, celebrity spokesmen for the Refuge System, protection of inland farms/open space

June 9, 1998

Outreach activity: Meeting, S. Kingstown Town Hall

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested group

Number of non-FWS participants: 2

Audience: South Kingstown Town Planners

Topics discussed: open space preservation, land acquisition funding, potential sites for protection/acquisition

June 9, 1998

Outreach activity: Meeting, TNC State Office, Providence

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested group

Number of non-FWS participants: 4

Audience: The Nature Conservancy

Topics discussed: wildlife dependant public uses, public input process, TNC’s land protection priorities, TNC focus areas and land protection efforts, expansion of Trustom Pond and Block Island NWRs, educational/conservation potential of corridor protection, focusing protection on Block Island’s north end, education center on Block Island, linking protection efforts along CT/RI border, United Nuclear site, vehicle use on beaches,

June 9, 1998

Outreach activity: Meeting, Save the Bay!, Providence

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested group

Number of non-FWS participants: 4

Audience: Save the Bay!

Topics discussed: oil spill money, Save the Bay’s focus systems: anadromous fish runs, wetlands, coastal salt marshes; land acquisition recommendations, restoration programs, education, research, outreach, water quality at Pettaquamscutt Cove

June 10, 1998

Outreach activity: Meeting, RI DEM

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested group

Number of non-FWS participants: 9

Audience: RI DEM

Topics discussed: representation of hunting groups, public input, land acquisition: sites, prices, funding, partnerships; goose hunting vs. restoration at Trustom, cooperative farming, implementation of CCP, breaching of coastal ponds, visitor centers (DEM’s, Sachuest, new Complex visitor center), sharing of equipment for habitat management, deer overpopulation on Block Island, hunting on Block Island

July 20, 1998

Outreach activity: Meeting, Sachuest Point NWR visitor center

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested groups

Number of non-FWS participants: 4

Audience: Aquidneck Island Land Trust, Coastal Resource Management Council

Topics discussed: protection of Sakonet Greenway, public input, land acquisition, Aquidneck Island planning group, identification/mapping of: critical habitat, farmland, historic/scenic/recreational areas, watersheds

August 17, 1998

Outreach activity: Meeting, Little Rhody Beagle Club

Purpose: discuss planning process, partnership opportunities, land protection and other issues with interested groups

Number of non-FWS participants: 16

Audience: RI Federated Sportsman Club

Topics discussed: hunting opportunities, public use activities, overabundant species

August 29, 1998

Outreach activity: Meeting, Community Partnership Kickoff, URI Narragansett Bay Campus

Purpose: involve Service in Partnership, inform partnership of CCP process

Number of non-FWS participants: 20

Audience: land protection agencies with interests in South Kingstown

Topics discussed: purpose of the Partnership, RI CCP, land protection efforts, land acquisition funding, water quality, preservation of natural/historic/cultural resources, tax benefits of land donation, public use in open areas,

September 4, 1998 (2nd mailing to adjacent landowners on Sept. 9)

Outreach activity: "Planning Update" mailed to addresses on mailing lists

Purpose: update the public on the status of the CCP project, share comments gathered from Issues Workbooks, open houses, and focus group meetings

Audience: Refuge mailing list (600+ names), adjacent landowners (Narragansett/Pett. Cove area; 450+ names)

Topics included: Service's Mission, CCP process, summary of public involvement, planning schedule, summary of workbook responses, public use: priority/wildlife dependant vs. non-wildlife dependant and compatibility determination; summary of open house and focus group comments, Refuge Complex vision statement, instructions for requesting a draft CCP (rather than an executive summary)

February 23, 1999

Outreach activity: Meeting, Narragansett Indian Tribe, Charlestown

Purpose: inform tribe of CCP process

Number of non-FWS participants: 3

Audience: Narragansett Tribal Council

Topics discussed: explain CCP planning process, how tribe might contribute issues/concerns, partnership possibilities

March 4, 1999

Outreach activity: letter to Narragansett Tribal Council

Purpose: solicit follow-up input from the tribe

Audience: Narragansett Tribal Council

Topics discussed: specific questions for the Council to address, suggestions for a partnership agreement

June 21, 1999

Outreach activity: 2nd Planning Update mailed to addresses on Refuge mailing list

Purpose: update the public on the status of the CCP process, explain the delay in publishing the draft CCP

Audience: Refuge mailing list (600+ names)

Topics included: updated planning schedule, information on new visitor center: funding, site selection, expected facilities, separate EA

July 20, 1999

Outreach activity: Meeting

Purpose: discuss range of land protection strategies proposed in the alternatives

Audience: RI TNC, Audubon Society of RI, RI DEM, USFWS Coastal Program (Ecological Services), Heritage Program

Topics included: Areas of Biological Significance and Focus Areas for land protection.

August 27, 1999

Outreach activity: Meeting

Purpose: discuss highlights of the tentative Proposed Action

Audience: RI DEM

Topics included: proposed actions, focus on waterfowl management and hunting proposals

September 9, 1999

Outreach activity: Meeting

Purpose: discuss highlights of the tentative Proposed Action

Audience: RI DEM (T&E coordinator) and The Nature Conservancy of Block Island

Topics included: proposed actions on threatened and endangered species and actions on Block Island.

September 20, 1999

Outreach activity: Meeting

Purpose: discuss highlights of the Proposed Action

Audience: Friends of the RI NWR Complex

Topics included: proposed staffing and funding levels, plover programs, Focus Areas (land protection)

September 23, 1999

Outreach activity: Meeting

Purpose: discuss highlights of the Proposed Action, pertaining to Block Island

Number of non-FWS participants: 15

Audience: Block Island Joint Conservation Association, RI DEM, Audubon Society of RI, Town of New Shoreham

Topics included: Areas of Biological Significance and Focus Areas for land protection on Block Island, highlights of the tentative Proposed Action, land protection efforts by conservation partners on Block Island

October 19, 1999

Outreach activity: Meeting

Purpose: discuss land protection strategies

Audience: Charlestown Conservation Commission

October 28, 1999

Outreach activity: Meeting

Purpose: discuss land protection strategies

Audience: South Kingstown Land Trust, TNC, RI DEM, Champlain Foundation, Town of South Kingstown, Narrow River Land Trust

October 1999

Outreach activity: Meeting

Purpose: discuss highlights of the proposed land acquisition strategy

Audience: South County Conservancy

Topics included: proposed land protection and acquisition within ABS's and Focus Areas

March 16, 2000

Outreach activity: Meeting

Purpose: briefing on release of Draft CCP

Audience: Friends of the RI NWR Complex

July 7, 2000

Outreach Activity: Meeting

Purpose: briefing on release of Internal Review Draft CCP

Audience: Congressional staff for Senators Chafee and Wegen.

August 29, 2000

Outreach Activity: Meeting

Purpose: briefing on the Proposed Action

Audience: Connecticut River/New York Bight Ecosystem team

September 6, 2000

Outreach Activity: submitted draft CCP/EA for Section 106 (cultural resources) consultation

Audience: Rhode Island State Historic Preservation Office

September 11, 2000

Outreach Activity: Section 7 consultation (endangered species) for draft CCP/EA

Audience: USFWS New England Field Office

October 11, 2000

Outreach Activity: Meeting

Purpose: discuss proposed actions in draft CCP/EA

Audience: RI DEM, Division of Fish and Wildlife